

The Military Compensation and Retirement Modernization Commission's Blended Retirement Plan: A First Look at Marine Corps Implications

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A handwritten signature in black ink that reads 'Anita Hattiangadi'.

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Abstract

The final report of the Military Compensation and Retirement Modernization Commission (MCRMC) proposes a blended retirement plan that would reduce the size of the defined benefit in the current retirement plan but would add an employer-matching Thrift Savings Plan and a continuation bonus. This plan has received significant support by the Congress and throughout the Department of Defense and is likely to be codified in law in the next National Defense Authorization Act. This research memorandum helps to begin the Marine Corps' analytic process for implementation of the proposed plan. It recaps key features of the proposed plan, reviews compensation management basics, identifies key force management objectives that could be affected by compensation changes, provides preliminary analysis for how these objectives could be affected by the proposed plan, and provides a framework to conduct detailed follow-on analysis.

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Executive Summary

The Fiscal Year 2013 National Defense Authorization Act (NDAA) established the Military Compensation and Retirement Modernization Commission (MCRMC) to develop and recommend compensation and retirement system reforms for the armed services. Among its many recommendations, the MCRMC report recommends that the Department of Defense (DOD) adopt a blended retirement plan that would reduce the defined benefit in the current plan but would add an employer-matching Thrift Savings Plan (TSP) and a continuation bonus. Although Congress and DOD are considering modifications to the MCRMC's proposed plan, the plan appears to be rapidly working its way through the legislative process in a form closely resembling the MCRMC recommendation.

As the services start to shift their focus to how they might implement the proposed plan, the Deputy Commandant for Manpower and Reserve Affairs asked CNA to conduct preliminary analysis of the proposed plan as a prelude to a more extensive follow-on analysis. This research memorandum provides the following:

- A recap of the basic features of the proposed plan (including DOD-recommended modifications)
- A review of compensation basics
- Identification of key force management objectives (FMOs) that could be affected by the implementation of the proposed plan
- Preliminary analysis for how the proposed plan could affect these FMOs (i.e., develop hypotheses for follow-on analysis), and
- A framework for follow-on analysis

Key features of the proposed plan

The proposed plan reduces the defined benefit in the current retirement plan by 20 percent (the multiplier is reduced from 2.5 to 2.0 percent) but adds a TSP component and a continuation bonus. The services would automatically contribute 1 percent of the servicemember's base pay to the TSP and then would match servicemember contributions up to maximum of 5 percent of base pay. Servicemembers would

automatically be enrolled in the TSP at 3 percent, but they could change this amount. The service contributions to the member's TSP would vest at the completion of 2 years of service (YOS). The services also would pay servicemembers a continuation bonus at 12 YOS equal to 2.5 times their monthly base pay; the servicemember then would incur an additional 4-year commitment. The proposed plan includes options that enable servicemembers to receive their full pension benefits at retirement or to take a lump-sum retirement payment with smaller pension payments until they reach social security eligibility, at which point they receive their full monthly pensions. Current servicemembers would be grandfathered into the current retirement plan but would be able to opt into the proposed plan.

Compensation basics

We discuss compensation concepts and definitions that are fundamental to analyzing how a change to the retirement plan might affect servicemember choices. The concepts and definitions include compensation objectives, employee and employer preferences for compensation types, the present value (PV) of future income streams, and personal discount rates (PDRs). We also discuss why servicemembers' PDRs might differ depending on their characteristics (e.g., their YOS) and how compensation components can “pull” servicemembers further along in their careers or “push” them to transition out of the military.

FMOs

Compensation policies play a key role in shaping the force to meet service FMOs. We identified seven FMOs (two overarching and five foundational) against which to evaluate the potential effects of the proposed plan:

1. Preservation of an organizational identity focused on warfighting excellence (overarching)
2. A ready, balanced, and useful force (overarching)
3. A dependable accession pipeline (foundational)
4. A healthy and sustainable career force (foundational)
5. An appropriate quality of life for Marines and their families (foundational)
6. Transparent compensation and retirement policies (foundational)
7. An affordable force (foundational)

Preliminary analysis of plan effects on FMOs

Our analysis of how the proposed plan could affect key Marine Corps FMOs is preliminary. We focus on two themes. First, we explore why key assumptions in the commission's work may or may not hold. Then, we do preliminary calculations with alternative assumptions to assess how the effects might change key FMO attainment. Our analysis indicates that the Marine Corps' ability to control costs while sustaining its accession pipeline, maintaining a healthy career force, and providing Marines and their families with a high quality of life depends heavily on the extent to which the commission's assumptions hold. The commission's work is short on exploring alternative assumptions and demonstrating how other plausible assumptions affect key force outcomes. Table 1 provides a summary of the expected effects on key FMOs if the commission's assumptions do not hold.

Table 1. How changes to commission assumptions might affect key FMOs

Assumptions	Descriptions of assumptions	What if the reality is higher than the estimate?	What if the reality is lower than the estimate?
PDRs	<ul style="list-style-type: none"> Enlisted PDR = 12.7 percent Officers PDR = 6.4 percent 	<p>If PDRs are higher for younger people:</p> <ul style="list-style-type: none"> Value of lost pension low relative to the gains from TSP and continuation bonus Could <i>positively</i> affect potential recruitment. 	<p>If PDRs are lower for <i>older</i> servicemembers:</p> <ul style="list-style-type: none"> Value of the lost pension high Could <i>negatively</i> affect retention Services may need to raise continuation bonus to meet retention goals Higher personnel costs
TSP contributions	Average DOD contribution of 4 percent of basic pay (BP)	<ul style="list-style-type: none"> Cost to services for TSP contributions are higher Potential savings lower Higher accumulated savings at retirement Less consumption during active service 	<ul style="list-style-type: none"> Lower cost to the services Greater potential savings Servicemembers will have more to spend while active, but lower accumulated savings at retirement

Assumptions	Descriptions of assumptions	What if the reality is higher than the estimate?	What if the reality is lower than the estimate?
Return on investment (ROI)	Investments in TSP accounts earn 7.3 percent nominal annual returns	<ul style="list-style-type: none"> Accumulated savings will be larger than estimated Saving into the TSP will be a better deal for servicemembers Potentially positive for retention and recruitment 	<ul style="list-style-type: none"> Accumulated savings will be lower at retirement TSP will be considered less of a good deal Risk to retention and accession rates
Continuation bonus	<ul style="list-style-type: none"> Enlisted: 2.5 months of BP at YOS 12 Officers: 2.5 percent of BP plus additional amount that services determine 	<ul style="list-style-type: none"> Potential savings to DOD will be less than the commission's estimates 	<ul style="list-style-type: none"> Probably will pay exactly 2.5 months of BP Potential savings will not differ from commission's estimates
Opt-in rate	Opt-in rates in the first year: <ul style="list-style-type: none"> 95+ percent of first term 75+ percent of second term 	<ul style="list-style-type: none"> Shorter time to enroll all servicemembers into new system Expected savings will accrue faster 	<ul style="list-style-type: none"> Would take longer to enroll all servicemembers Potential savings would not accrue as fast as commission's estimates

Source: MCRMC report and CNA analysis.

Although our preliminary analysis provides no definitive answers to how the force will be affected, it served its key purpose of charting the way forward for follow-on detailed analysis. The primary focus of our follow-on analysis will be to vary these assumptions so that we can provide senior leaders, manpower planners, and budgeters with robust estimates that will enable them to craft internal force management and budgetary plans that can effectively respond to a range of plausible scenarios.

Framework for follow-on analysis

For our follow-on analysis, we will use a personnel-retention and cost-simulation model to estimate the proposed plan's effects on YOS profiles, costs, and related

FMOs. CNA's simulation model—composed of a compensation and retention component, a personnel aging component, and a cost component—enables analysts to change key assumptions (such as PDRs, wage elasticities of retention, servicemember TSP contribution percentages, and grandfathering rates) to estimate the proposed plan's effects under various scenarios.

Using data from various Marine Corps and DOD manpower and recruiting databases and applying selected combinations of the assumptions identified above, CNA will estimate the proposed plan's effects (at the organizational and individual Marine level) from initial implementation through steady state for the following:

- Active component (AC) officers and enlisted Marines
- Reserve component (RC) officers and enlisted Marines
- Combinations of AC and RC service for officers and enlisted Marines (i.e., Marines who typically would start in the AC and transition to the RC at a later point in their careers)
- Selected occupational fields

Closing caveat

This report contains preliminary analysis that does not provide a sufficient basis for making decisions about proposed plan implementation. The report explores how the proposed plan could affect the Marine Corps and helps to uncover the questions and issues that follow-on analysis can help to address.

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Glossary

AC	Active Component
AFQT	Armed Forces Qualification Test
ARMS	Automated Recruit Management System
BP	Basic Pay
CPI	Consumer Price Index
DB	Defined Benefit
DC	Defined Contribution
DC, M&RA	Deputy Commandant, Manpower and Reserve Affairs
DOD	Department of Defense
DOPMA	Defense Officer Personnel Management Act
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities
ECFC	Enlisted Career Force Controls
FMO	Force Management Objective
FV	Future Value
MARADMIN	Marine Administrative Message
MCRISS	Marine Corps Recruiting Information Support System
MCRMC	Military Compensation and Retirement Modernization Commission
MCTFS	Marine Corps Total Force System
M&RA	Manpower and Reserve Affairs
MOS	Military Occupational Specialty
MRTF	Military Retirement Trust Fund
NDAA	National Defense Authorization Act
PDR	Personal Discount Rate
PV	Present Value
RC	Reserve Component

ROI	Return on Investment
TFDW	Total Force Data Warehouse
TSP	Thrift Savings Plan
YOS	Years of Service

Introduction

Under the FY 2013 National Defense Authorization Act (NDAA), Congress established the Military Compensation and Retirement Modernization Commission (MCRMC) to develop and recommend reforms to armed forces pay and benefits. The commission published its final report in January 2015, which includes 15 recommendations grouped as follows:

- Pay and retirement: recommendations 1 through 4
- Health benefits: recommendations 5 through 8
- Quality of life: recommendations 9 through 15 [1]

The Deputy Commandant, Manpower and Reserve Affairs (DC, M&RA) asked CNA to analyze Marine Corps force management implications of recommendation 1—the recommendation for a blended retirement plan. The blended retirement plan would essentially add a defined-contribution (DC) element to the services’ traditional defined-benefit (DB) 20-year cliff-vesting retirement plan.

MCRMC blended retirement plan

A summary of the key features of recommendation 1’s blended retirement plan (along with the Department of Defense’s (DOD’s) proposed modifications) follows:¹

- The services would compute the active component (AC) servicemember retirement annuity using a 2-percent multiplier times years of service (YOS) times the retired pay base.² Under the current system, the multiplier is 2.5

¹ Other versions of the commission’s plan are being considered by Congress as part of the FY 2016 NDAA debate. We do not specifically identify those versions in this report; however, we do note that the versions being considered by Congress are closer to the commission’s recommendation than to the DOD proposal.

² For most servicemembers, retired base pay is the average of the three highest years of annual base pay (High 3)—typically their final three YOS. Retired base pay for those who entered service before September 8, 1980, is based on their single highest year of annual base pay.

percent times YOS times retired pay base. This represents a 20-percent reduction in the retirement annuity. The same calculation would apply to reserve component (RC) servicemembers, except that DOD uses an “effective YOS,” which is computed by dividing the number of reserve points, based on days in training or days mobilized, by 360.

- At retirement, AC servicemembers could choose (1) monthly retirement payments, (2) a lump sum with reduced monthly retirement payments until full social security eligibility (at which point the full monthly pension amount would be paid), or (3) a larger lump sum with no monthly retirement payments until full social security eligibility. RC servicemembers could choose (1) a lump sum at retirement with reduced monthly payments until full social security eligibility or (2) a larger lump sum with no monthly payments until full social security eligibility. Lump sums would be paid on retirement from the RC, which usually is before the retirement annuity begins at age 60. The current DOD proposal does not provide this lump-sum option [2].
- The commission’s DC plan is a benefit by which servicemembers and the services would contribute to a servicemember’s retirement savings account. This would reside entirely in DOD’s Thrift Savings Plan (TSP).³ Under the current system, the TSP is entirely voluntary and DOD makes no contributions. Under the commission’s plan, the services would contribute 1 percent of a servicemember’s basic pay to their TSPs. This contribution would be made regardless of whether a servicemember actively participates in the TSP (i.e., all servicemembers would have a TSP). Servicemembers would automatically be enrolled in a TSP at an amount equal to 3 percent of their basic pay, but, after a certain period of time, they could terminate their participation (and still would receive the 1-percent service contribution). The services would begin matching servicemember TSP contributions up to a maximum of 5 percent of monthly basic pay after the servicemember completes his or her second year of service. In addition, under the commission’s plan, servicemembers would be fully vested in their TSP after their second year of service. DOD’s proposal, however, recommends that matching contributions not begin until completion of 4 YOS, in order to reduce the incentive to accumulate savings and separate [2].
- Under the commission’s plan, the services would provide a continuation bonus equal to 2.5 times a servicemember’s monthly basic pay for all servicemembers

³ A 401(k) is an example of a DC plan provided by employers in the private sector. The commission’s DC is similar in concept to a 401(k), though with some rules that differ. For details, see the federal government employee website: <https://www.tsp.gov/index.shtml>.

who reach 12 YOS and are willing and able to incur an additional 4-year obligation. DOD's proposal, however, recommends that the services have the latitude to determine the YOS (between 8 and 16) at which a continuation bonus would be paid, the skills that would be eligible for the bonus, and the multiplier to be applied (up to 22 times monthly base pay for AC servicemembers and up to 11 times monthly pay for RC servicemembers). In addition, in the DOD plan, the services themselves would determine the payout construct and the associated service obligation that servicemembers would incur [2].

- Under both the commission's and DOD's proposals, all currently active servicemembers would be grandfathered into the current retirement system but could choose to opt into the new blended retirement plan [1].
- In both the commission plan and the DOD proposal, all servicemembers would receive financial literacy training provided by the services to help them make good choices about whether or not to opt in to the new system, how to participate in their TSP, how much to contribute into their TSP accounts, and how to manage their TSP portfolios.

Methodology

This study is a “first look” at how the features of the MCRMC blended retirement plan might affect the Marine Corps' attainment of its key force management objectives (FMOs). We use qualitative analysis and analytic reasoning to gauge potential effects on FMO attainment, and we set the stage for more detailed qualitative and quantitative analyses in a follow-on study.

We start with an overview of compensation basics. We then identify the Marine Corps' key FMOs. The commission's report does not comprehensively define service FMOs; instead, it largely focuses on ensuring that the services “maintain similar active-duty force profiles” (i.e., similar to current service active-duty officer and enlisted continuation rates) [1].⁴ Although force longevity and continuation rates are central elements of each service's FMOs, we believe that a more complete identification of the Marine Corps' key FMOs will help us to better analyze how the blended retirement plan could affect other important force dimensions and priorities. In addition, we also consider other service FMOs to understand how the

⁴ More broadly, the discussion of FMOs among stakeholders revolves around not compromising the All-Volunteer Force.

Marine Corps' FMOs differ and what the implications could be for implementation of the proposed plan.

We then analyze how we might expect the commission's blended retirement plan to affect Marine Corps FMO attainment. This portion of the analysis will help us to identify those aspects of the blended retirement plan that could have the most effect on key FMOs. It will help to lay the needed groundwork for follow-on analyses and to identify Marine Corps internal force management adjustments that could mitigate any unintended negative consequences of the new retirement plan.

We finish our first look by identifying the analytic approaches that we will use in detailed follow-on analyses. We discuss the range of possible scenarios that we expect to empirically model, the types of data that will be needed, the assumptions that we will subject to sensitivity analysis, and the detailed analytic methods that we expect to use.

Compensation Basics

To establish how compensation changes affect FMOs, it is helpful to first examine the purpose of compensation in general and to consider the objectives of its various component compensation packages.

We start with a general discussion of compensation, tailored where appropriate to the military experience, and then finish this section with more specific applications of compensation theory as they relate to the Military Compensation and Retirement Modernization Commission's proposed plan.

Compensation's objectives

The overarching objective of any compensation package is to create incentives that influence recruitment, retention, and productivity, while also allowing personnel managers to acquire the type of workforce needed to accomplish the organization's goals. This is true for all organizations, whether military or civilian, profit or non-profit. A military organization's objectives may differ from those of a civilian organization; the Marine Corps' objectives may differ from those of the other services. But all organizations use various compensation forms to recruit, motivate, and retain the types of people that they need.

Direct effects

Direct compensation outcomes are measured by the "push" and "pull" effects of pay on careers. Pull effects are described by the extent to which a compensation component pulls employees (servicemembers) further into their careers. For example, when a signing bonus is offered by a firm, it pulls a person toward starting employment with the company. Retention bonuses then pull employees into additional employment periods with the organization. Push effects do just the opposite. They provide an incentive to leave the organization. For example, severance (separation) payments are cash offers to leave. Pensions can have both pull and push effects.

Within a compensation package, organizations use a variety of compensation tools to create pull/push effects to attain various objectives. For example, military

continuation bonuses tend to be offered to first- and second-term servicemembers because the military needs an instrument with a pull effect on those members. The military has other compensation forms (specifically, the retirement benefit) for a pull effect on third- and fourth-term servicemembers.

Indirect effects

Indirect compensation effects are harder to classify and describe. They are, nevertheless, important factors in the types of compensation that employers offer and the types of employees that they attract. For example, although all employers need some mix of new and experienced employees, some may prefer a higher proportion of one or the other. Employers who prefer a larger number of older, more experienced employees may offer a very large pension, which incentivizes longer careers, whereas employers who prefer a younger staff may offer smaller pensions and more cash bonuses.

Various payment types are used to incentivize greater short-term productivity, (piecework or productivity bonuses), greater loyalty (profit sharing or large health insurance benefits), and greater team spirit and/or a greater sense of fairness (pay equality).

Relative value of different compensation forms

An important factor that employers must consider when determining compensation packages is that employees may place a wide range of values on different compensation forms. One example of this is the different values that employees place on in-kind compensation. Health insurance benefits will usually be more valuable to older employees than younger, healthier employees; younger employees will generally have a greater preference for a paid maternity leave benefit.

With in-kind benefits, employees may even place a different value on a compensation form than it costs an employer to provide. Some employers may offer certain types of counseling benefits (e.g., marriage counseling) even when only a tiny minority may value and use this benefit. Nevertheless, an employer may offer it because those few employees may need it in order to remain productive.

Valuation of future benefits

Retirement benefits, particularly pension benefits, are valued differently among individuals, and may be valued differently by the employee and employer. They might place different values on the retirement benefit because of discounting. These

varying benefit valuations occur because, although everyone discounts the value of future payments relative to current pay, some discount it a lot, and some only a little. Employers typically discount future payouts only a little because an employer's discount rate includes only the time value of money, whereas an employee's discount rate also includes other factors, such as impatience, payment uncertainty, or a preference for current over future consumption. Demographic characteristics also affect the extent to which employees value the promise of future payments differently, and how those values may change over time relative to current payments. In the next subsection, we describe why discounting is a critical factor in compensation management and how discounting actually works.

Discounting the value of future pay

Retirement benefits are potential future income, rather than current income. Forecasts of how employees will respond to changes in the retirement system, the relative ability for organizations to maintain desired workforce profiles, and the potential cost savings from retirement reform all depend on assumptions and estimates of how employees discount future compensation relative to current pay.

In general, people prefer receiving pay today to receiving pay in the future no matter how well it is guaranteed. The extent of a person's preference is revealed in a personal discount rate (PDR). PDRs reflect an employee's perception of the relative value of current and future payments, and they are used in a calculation called present value (PV) of deferred income.⁵

Some people have high PDRs, and some have low PDRs. While all people prefer getting paid today over getting paid the same amount in the future, people with a high PDR have a greater preference for getting paid today than people with a low PDR. People with low PDRs require less return on deferred income and, thus, will place a higher PV on the retirement benefit and will place a higher value on any retirement benefit reductions.

Consider two people: person A has a PDR of 0.05 and person B has a PDR of 0.10. Both receive a deferred benefit, for example, of \$10,000, payable in 10 years. Person

⁵ The present value of a payment (or income) that is promised in the future is the dollar value a person or organization places *today* on that payment. Future payments are worth less than the same payment if received today. So, for example, a promise of \$1,000 paid one year from now might be worth only \$900 today. People and organizations discount future payments because payments received today can earn interest, because inflation can whittle away the value of a future payment, because there is always some level of uncertainty about actually receiving the future payment, and because, simply, people would prefer to be able to spend the payment (i.e., buy things with it) today than tomorrow.

A, with a PDR of 0.05, will perceive that this benefit has a PV of \$6,140 ($\$10,000/(1.05)^{10}$), whereas person B's PV will be \$3,855 ($\$10,000/(1.1)^{10}$).

As we can see, person A places a much higher value on this benefit than person B. According to this theory, person A would be roughly indifferent between receiving the deferred benefit of \$10,000 in 10 years and receiving \$6,140 in cash right now. Person B, however, would only need to receive \$3,855 in cash today to be indifferent between the deferred benefit and the current cash.

This also means that if that benefit were reduced by 10 percent, for example, person A would perceive that as a \$614 loss, whereas person B would perceive it as only a \$385 loss. In theory, if we wanted to cut the benefit by 10 percent, and yet keep both of these people indifferent between the old and new benefit, we could replace the amount lost with a cash payment of \$614 to person A and \$385 to person B.

How does this relate to retirement policy? Suppose person A was an employer (referred to subsequently as employer A) who promised a \$10,000 future benefit to person B (subsequently referred to as employee B). One reason why employer A could have a discount rate of five percent is because that is what the employer can earn each year on an investment. Such is the case with DOD, for which investment opportunities are limited to government bonds, which earn about five percent.⁶ In this case, employer A would need to invest \$6,140 at a five percent annual return in order to have \$10,000 to pay employee B in 10 years. But, employee B values that benefit at only \$3,850. So in theory, employer A could save money by just giving employee B the \$3,850 instead of the deferred benefit.

Why would employer A not just give employee B the cash instead of the deferred benefit? One reason is that employer A wants to attract a variety of people, not just people like employee B. Employer A may want to attract other employees who, like employer A, value the benefit at \$6,140. Another reason is that both the employer and employee may value a deferred benefit in ways that make up for the simple difference in financial valuation.

In the next subsection, we discuss the military pension and the ways that military personnel value the benefit. In addition, we describe the reasons why DOD could prefer to offer a pension over cash, and why employees—and, specifically, military personnel—could prefer a pension over cash payments.

⁶ According to DOD Office of the Actuary, the DOD discounts future expenditures by 5.25 percent because that is DOD's cost of funds.

Present value of a military retirement

In studies about retirement benefits and other forms of future payments, researchers often will estimate the PV using some plausible PDR value. They will use these along with estimates of relative retention elasticity (i.e., the percentage change in retention resulting from a 1-percent change in pay), to forecast how servicemembers will respond to retirement benefit changes.

As we showed in the previous section, servicemembers who retire under the current system are entitled to 2.5 percent * High_3 pay base * YOS. Thus, at YOS 20, an enlisted servicemember is entitled to half of his or her High_3 pay base for life.⁷ The commission suggests that this is an average of about \$25,820 per year (in the case of an E7) for roughly 46 years. This is about \$1,187,630 in total payments (\$25,820 times 46). Yet the typical servicemember (or any person) would not place nearly that much value on this pension benefit, since those are future payments, many of which would come far into the future. As a result, the value of the benefit, specifically the PV of this benefit, depends critically on the PDR.

The military retirement pension, when earned, is a guaranteed, inflation-protected, lifetime annuity. In general, the PV of this annuity type is calculated as follows:

$$PV = \sum_{t=1}^T \frac{A * (1+i)^t}{(1+d)^t} = \frac{A * (1+i)}{(d-i)} * \left[1 - \frac{(1+i)^T}{(1+d)^T} \right] \quad (1a)$$

where:

A = the annual payment (in real terms,⁸ here we estimate it at \$25,820)

d = PDR (the commission assumes 12.7 percent for enlisted servicemembers and 6.4 percent for officers)

⁷ The High_3 pay base is equal to the average of a servicemember's highest three years of basic pay, usually the final three years. The MCRMC illustrated this in its final report by considering an E-7 who retires at age 38 and lives until age 85. According to the DOD Compensation Greenbooks for 2012-2014, High_3 for an enlisted person, who was an E-7 for those three years, would have been roughly \$51,640. Half of that is \$25,820. For a notional O-5 who retires at age 42, the analogous pension amount is estimated to be \$49,485.

⁸ The real value of the military retirement pension for any following year is equal to the dollar amount divided by the inflation rate for the previous year. Thus, the real value of the annuity is constant at \$25,820 because the dollar amount received by the retiree will be increased each year by the inflation rate as estimated by the Consumer Price Index (CPI).

T = number of years a retiree expects to receive the pension (the commission assumes 46 years).

i = expected annual rate of inflation

The commission assumes that $i = 0$ (i.e., there is no inflation) and thus the annual pension amount will remain the same throughout the retiree's life. In that case, equation 1a reduces to equation 1b:

$$PV = \frac{A}{d} * \left[1 - \frac{1}{(1 + d)^T} \right] \quad (1b)$$

The commission also assumes that $A = \$25,820$, $d = 0.127$, and $T = 46$ years for an enlisted servicemember. Using these values, and assuming an inflation free world, the estimated PV of the typical enlisted person's pension would be:

$$PV = \frac{25,820}{.127} * \left(1 - \frac{1}{245} \right) = \$202,476, \quad (2)$$

which is *substantially less* than the total monetary payments of \$1,187,630.

Under the new system, the enlisted annuity would be 2.0 percent * High_3 pay base * YOS, which would be 40 percent of High_3 pay base at YOS 20. Using the same data as we did above, the annuity would be about \$20,655, or 20 percent less than the annuity under the current system. These payments sum to about \$950,130, 20 percent of the total sum under the current system, and the PV of the retirement benefit would be:

$$PV = \frac{20,655}{.127} * \left(1 - \frac{1}{245} \right) = \$161,980, \quad (3)$$

which is 20 percent less than the PV of the retirement benefit under the current system, and again, far less than the sum of all payments.

According to the MCRMC, an O-5 officer who retires at age 42 would receive about \$49,485 in annual retirement pension payments. If he or she lives to 85, this is about \$2,078,370. Again though, the PV depends on the PDR. The commission assumes that the average officer has a discount rate of about 6.4 percent.

As a result, the estimated PV of the officer's pension is:

$$PV = \frac{49,485}{.064} * \left(1 - \frac{1}{94}\right) = \$716,074, \quad (4)$$

which, again, is *substantially* less than the total monetary payments of \$2,078,370.

Under the new system, the officer's annuity would also be 40 percent of High_3 pay base at YOS 20. Using the same data as we did above, the annuity would be about \$39,590, and would amount to about \$1,662,700, or 20 percent of the total sum under the current system. The PV of the retirement benefit would be:

$$PV = \frac{39,590}{.064} * \left(1 - \frac{1}{94}\right) = \$572,860, \quad (5)$$

which is 20 percent less than the PV of the officer's retirement benefit under the current system and, again, far less than the sum of all payments.

Our discussion above includes the commission's estimate of the pension value at YOS 20. In other words, these are the values the commission estimates that servicemembers give to the pension *once they become eligible for it*. As we have seen, these values depend critically on assumptions of servicemembers' PDRs. Other PDRs also matter, however, as servicemembers progress toward retirement eligibility. For servicemembers who still must reenlist to accumulate enough time to earn the retirement benefit, the amount of time until reaching retirement eligibility and the uncertainty of reaching it also influence their PDRs.

Employer and employee preferences for retirement plans

If people discount future compensation relative to current pay, why do employers provide a retirement benefit in the first place? In particular, why do they provide a pension as opposed to a DC or even cash, which is likely to be discounted by far less? A pension has a pull-push effect, but so does cash. People discount a pension, whereas they do not discount cash, so the push-pull effects should be greater under a DC plan or cash payment.

The questions here are:

1. Why would employers prefer giving a pension to giving cash?
2. Why would employees prefer to receive a pension benefit over cash?

3. How does a TSP differ in its effects from a pension?

Why might employers prefer giving a pension?

There are at least three reasons why an employer might provide a pension benefit: (1) pull effect toward completing a career with the organization, (2) push effect at retirement, and (3) prevention of poverty for retirees.

First, a pension exerts a pull incentive that causes employees to want to complete a career with the employer. This pull becomes stronger as the employee approaches retirement eligibility, and when experience and management ability are strong. The military retirement is especially strong because it is large, relative to the vast majority of civilian plans.

Second, a pension results in a push incentive for people to leave employment once they qualify to receive the benefits. The employer may observe that personnel become less productive once they have reached a certain age, and wish to have an incentive for senior employees to leave. Again, the military pension has an especially strong push effect both because it is large and because servicemembers become eligible at a young age, relative to employees in most civilian plans. In addition, this push effect will be important to the military to the extent that it wants a relatively youthful force.

Third, a guaranteed, inflation-protected pension prevents former career employees (e.g., retired veterans) from becoming financially destitute after they have completed their careers. This is especially important for the military, which is highly visible to the public. Pictures of retired veterans in poverty can reflect unfavorably on the services and DOD.

Thus, although because of discounting, the cost of a retirement benefit will be higher than its monetary value to servicemembers, these benefits to the services likely outweigh the extra costs.

Now, however, Congress and DOD are considering changing the retirement from one that solely provides a pension, to one that offers at least three different types of pay. As a result, the changes will affect people differently, providing less value for some and more for others. The overall effect of the blended plan depends on the interaction of all these effects. This is the context in which we will analyze the new blended retirement plan and its anticipated effects on FMOs.

Why might employees prefer a pension?

Why might employees (specifically servicemembers) prefer pensions over cash? Answers could include (1) tax deferred benefit, (2) security in old age, and (3) reduced market risk for savings.

First, the pension value is not taxed until it is received. As a result, returns on pension contributions can be higher than returns on pretax dollars. Consider the fact that the services contribute about one-third of basic pay to the Military Retirement Trust Fund (MRTF) each year. If they were to simply give servicemembers that cash, it would be taxed, and any investment returns would accrue on pretaxed dollars.

Second, behavioral economic theory suggests that, because of discounting, workers would rather have cash for spending than contributions to a pension. However, they also know that, if they do not save for retirement, they could regret it when they are older. As a result, they like a commitment to have money set aside for a pension. This is why many employees prefer that an employer provides a retirement benefit in lieu of higher wages, in order to force them to save for their old age [3].

Finally, there are three types of risk that an employee faces with a pension. First, there is *market risk*—referring to the fact that the market has up and down periods in which the pension's value rises and falls. With a pension, this market risk is borne by the employer rather than the employee. Second, there is *employer risk*, in which the firm itself could go out of business or into bankruptcy and jeopardize the pension's value. With the military retirement, this type of risk is practically zero. Finally, countering the first two, there is the *risk of not reaching the benefit vesting point*. This risk is small for nonmilitary employees since the law requires that the employer vest the employee early in his or her career. This risk is large for servicemembers since they are not vested in the pension until 20 YOS, and there are rules (e.g., up-or-out promotion rules) by which a servicemember may become disqualified to continue in the service before reaching retirement eligibility.

In general then, both DOD and servicemembers value the retirement benefit at a higher rate than simple discounting would suggest. The DOD values the benefit for its pull and push, continuation, and separation effects, as well as for preventing the negative public image of poverty-stricken retired veterans. Servicemembers value the retirement benefit for its tax benefits, its commitment value, and its management of financial risk.

How does a TSP differ in its effects from the pension?

The TSP benefit is a series of contributions by DOD into an account that the servicemember owns. As we previously discussed, under the proposed plan, DOD automatically would contribute 1 percent of the servicemember's basic pay plus an

amount that would match the servicemember's own contribution, up to 5 percent of basic pay. By rule, the contributions would stay in the account and collect returns until the servicemember is allowed to (and chooses to) withdraw the funds. The general rules are that the funds cannot be withdrawn, except for certain explicit exceptions, as long as the servicemember is in the service. After that, although they can be withdrawn, there is usually a tax penalty that is typically 10 percent of the withdrawal amount until the retiree reaches age 59½.

To ascertain this benefit's value to a servicemember who is deciding whether to join or stay in the Marine Corps, we need to estimate the future value (FV) of the accumulated contributions using estimates of the contribution rate and the expected return on investment (ROI).⁹ We then estimate the PV of that FV, using estimates of the PDR and the number of years until the Marine will separate from the Corps. The concept of "the PV of the FV" is unusual. It is appropriate, however, since DOD's contribution is made into the TSP account today and will earn interest for the remainder of the enlistment term—hence the FV. Nevertheless, since the servicemember cannot withdraw from the TSP until he or she separates from the service, the accumulated savings will not be received until sometime in the future—hence the PV.

The following is a general equation to illustrate the calculation for the PV of the accumulated TSP contributions by DOD for the potential recruit:

$$(1 - p) * \frac{\sum_{y=yos-\hat{y}}^y (0.01) * BP_{yos} * (1 + ROI)^{(y-y)} + \sum_{z=yos-\hat{y}+v}^y (C) * BP_{yos} * (1 + ROI)^{(y-z)}}{(1 + d)^{y-\hat{y}}} \quad (6)$$

where:

BP = basic pay

p = penalty for early withdrawal; $p=0.1$, if age < 59½; 0 otherwise

ROI = the expected annual return on contributions

C = the expected DOD matching contributions

d = the servicemember's expected subjective PDR

⁹ The future value of a payment is the value someone would place in the future of a payment that is made today. The FV is typically based on the expected earnings of that payment over time. So, for example, if I receive \$1,000 today, and expect it to earn 10 percent per year, the FV of the payment next year would be $\$1,000 * (1 + .10) = \$1,100$.

yos = the current year of service

\hat{y} = YOS at the beginning of the term

γ = YOS at the end of the term

$\nu = 2$ if the servicemember is in his or her first term; 0 otherwise..¹⁰

In general, a TSP is part of a retirement plan. However, its effects on servicemembers will differ markedly from those of a pension. First, the pull and push effects are different. A pension's pull is for an entire career, from the moment the employer begins contributing to the pension trust fund until the employee becomes eligible to retire. Because the accumulated funds in a TSP can be withdrawn on separation from service, albeit with some penalty, its pull effect is only for the length of a single contract. Further, its push effect may occur at the end of that single contract, perhaps providing some small incentive to separate early in a career.

Second, because the TSP's funds can be fully withdrawn and spent on separation, again with a penalty until age 59½, it does not provide protection from poverty as does the pension, which is paid out in proportional increments over the remainder of the recipient's lifetime.

The TSP's advantages relative to a pension for an employer are twofold. First, because the funds are potentially available more quickly than a pension, servicemembers do not discount the employer's contributions as heavily as a pension, producing a narrower gap between the employer's cost and employee's value and potentially higher pull-effect. Thus, it could be a more powerful instrument for incentivizing retention, at least early in a career. Second, because the employer owns the pension funds while the employee owns the TSP funds, moving from a pension to a TSP transfers the investment's market risk from the employer to the employee. This is a big factor for many private-sector firms. Because the government invests the pension trust fund only in treasury bonds, however, its risk is small. Thus, there really is no transfer of market risk (i.e., a TSP only adds market risk to the servicemember).

It is likely, however, that most servicemembers either do not intend to make a career of the military or do not think that they will remain eligible to make the military a

¹⁰ The parameter ν subtracts 2 years from TSP contributions and annual ROIs because first-term servicemembers don't receive TSP contributions until the third year of service.

career.¹¹ As a result, we would expect that they will place a much higher value on, and thus will prefer, a TSP over a pension.

Continuation bonuses

The continuation bonus provided for in the MCRMC's retirement recommendation is not currently part of the military retirement plan. The commission sees the continuation bonus as a replacement for some of the lost value of the new pension, which it hopes will incentivize servicemembers to continue in the service.

Continuation bonuses serve one objective: to incentivize servicemembers to stay in the military for at least four more years, in this case from YOS 12 to YOS 16. The advantages that continuation bonuses have over retirement plans are twofold. First, they are provided as immediate cash payments, or sometimes in prorated payments over the contract's term. As a result, servicemembers' discounting factors for these payments would be relatively small and thus be more likely to incentivize retention.

Second, at least under DOD's proposal, they can be targeted to servicemembers in needed occupations and YOS and, thus, can be a powerful force management tool. In addition, with targeted continuation bonuses, economic rents are smaller, reducing the cost of incentivizing reenlistment.¹²

Blended retirement system

In the blended plan, the commission proposes to convert the current, all-pension system into one that contains all three of the components described above. In doing so, it will be transforming the incentives in identifiable ways. First, for example, reducing the pension's size by 20 percent will reduce the pull effect it has on

¹¹ In fact, only about 14-15 percent of recruits and about 30 percent of second-term servicemembers ever reach YOS 20. These facts lead to both uncertainty for many servicemembers that they will ever become eligible for retirement and to the perception that the current retirement system is unfair to most servicemembers.

¹² Economic rents are defined as payments to servicemembers to incentivize continuation—payments that are over and above the amount they would have needed to be enticed to stay. Rents exist when the same payment is given to everyone within a group of servicemembers. For example, a selective reenlistment bonus is given to all within a specified military occupational specialty (MOS) and paygrade who reenlist, regardless of their original intention. Everyone in the military who stays to 20 YOS receives the military pension, regardless of whether he or she needed that large an incentive to remain in the military until retirement eligibility. The more targeted the payment, the smaller the rents.

potential career servicemembers *and* will reduce its push effect on servicemembers at YOS 20. As a result, the commission proposes other pay components, partly to counteract the reduced pull of the pension and partly to change the incentives to achieve certain FMOs. We recap the pull and push effects that we might expect in Table 2 before further examining specific effects that we might expect for key FMOs in the next section.

Table 2. Pay components and expected effects

Component	Pull effect	Push effect	Other effect(s)
Pension	Pension provides incentive for members to make military a 20-year career	Ability to begin receipt incentivizes 20-year members to separate	Postservice income prevents poverty among retired veterans (public image)
TSP	Annual contributions provide incentive to stay one more term	Accumulated savings provide incentive for members to separate at end of term	Risk assessment: 1) More certain receipt than pension for members 2) Less certain market outcome than pension
Continuation bonus	Pull effects: 1) If reenlistment decision is made before YOS 12, provides incentive to stay until then 2) At YOS 12, provides incentive to stay to YOS 16	No push effect	Could keep members long enough for pension pull effect of retirement to become strong
Grandfathering	Mitigates changes in pull effect of pension change for current members	Mitigates changes in push effects of pension change for current members	1) Perception of keeping faith w/ members 2) Reduction of financial risk for current members

Component	Pull effect	Push effect	Other effect(s)
Opt-in for new system	May create additional pull effect on current members who prefer the new system	Opt-in means they prefer the new system, so maybe no effect; could possibly have the same effect as TSP	Perception of fairness for current members who may prefer the new system
Financial education	Higher financial awareness could allow higher returns to servicemembers, with consequent pull effect	Higher financial awareness could be result of service-members valuing the retirement benefit less than before, resulting in push effect	Added transparency in compensation system: 1) Good for servicemembers' financial security 2) Good DOD public image 3) Better assessment of military relative to civilian compensation and, thus, better retention decisions

FMOs and the MCRMC Blended Retirement Plan

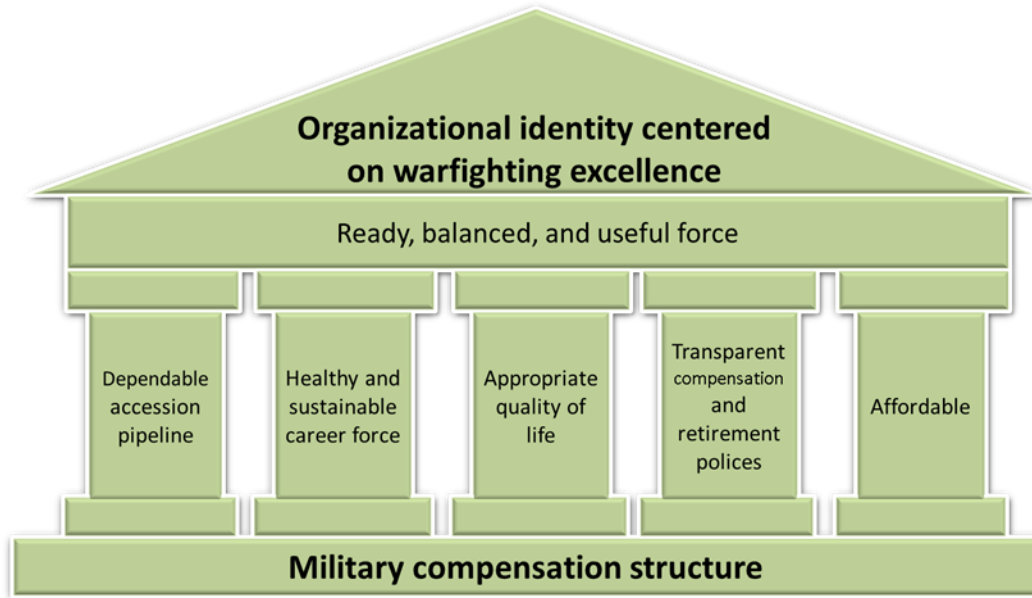
The services use the DOD compensation and retirement system and other force management policies to help achieve their FMOs.¹³ Here, we identify the Marine Corps' key FMOs (with a focus on those related to compensation/retirement policies) and discuss their relationship to other service FMOs. We then analyze how we expect the blended retirement plan's features to affect FMO attainment.

Marine Corps FMOs

The Marine Corps does not have one comprehensive document that lists its FMOs; however, working with manpower planners and analysts from throughout M&RA, we compiled information on key FMOs using various Marine Corps strategic/campaign plans, policy/commander's intent documents, Marine administrative messages (MARADMINs), manpower planning and program documents, and other statutory and regulatory documents, such as the Defense Officer Personnel Management Act (DOPMA). Documents that announce specific annual force management policies, programs, and procedures related to recruiting, classification, retention, promotion, and retirement generally contain background information that identifies and explains their intent. This background information is helpful for piecing together a sufficiently complete picture of FMOs, which we then can use as criteria for evaluating the blended retirement plan (i.e., would we expect the new plan to help or hinder attainment of these key FMOs?) (see Figure 1).

¹³ Some DOD compensation and force management policies are prescriptive in nature and do not allow the services discretion in how they are used to attain service FMOs; others give the services considerable discretion to influence FMO attainment. For example, officer promotion processes are codified in law, whereas enlisted promotion policies are largely left to the individual service chiefs.

Figure 1. Marine Corps FMOs



The military compensation and retirement system affects Marine Corps FMOs and their ability to work both individually and collectively to define and produce the force that the Marine Corps needs to accomplish its assigned missions.¹⁴ For example, having a dependable accession pipeline is a critical FMO in its own right for producing a first-term force. Adequate recruitment also supports the sustainment of a healthy career force by supplying the types of servicemembers who are qualified for and want to pursue military careers. High quality of life directly affects the servicemembers' productivity but also supports a dependable accession pipeline by making the service attractive. We next identify and briefly discuss the overarching FMOs and each of the foundational FMOs that support them from Figure 1.¹⁵

¹⁴ In architecture, pillars work in two ways. First, each pillar works independently to support its share of the structure's weight. Second, the pillars work as a unit by distributing the structure's weight evenly across the structure's foundation, while maintaining working space between the pillars. The FMOs also work independently and together to achieve a ready, balanced, and useful force.

¹⁵ In this first-look report, we do not provide a detailed examination of all components of the Marine Corps' FMOs. We expect to refine these FMOs in our follow-on study.

Organizational identity centered on warfighting excellence

The Marine Corps' FMOs must ultimately work together to reinforce the Marine Corps' identity as a premier warfighting organization and to create a force that can withstand the scrutiny of war as its "ultimate auditor."¹⁶ The value of force management changes must be explained to Marines and their families in terms that:

- Clearly communicate the kind of relationship that the Marine Corps wants to have with its Marines and their families
- Reduce uncertainty and distraction
- Promote trust
- Do not distort or dismiss the brutal and enduring nature of war
- Do not unweave the essential fabric of the Marine Corps and its core values [4]

A ready, balanced, and useful force

To achieve the overarching objective of reinforcing the Marine Corps' identity as a premier warfighting organization, the Marine Corps must have a ready, balanced, and useful force that effectively integrates doctrine, organization, training, materiel, leadership and education, *personnel*, and facilities (DOTMLPF) to accomplish assigned missions across the range of military operations. From a personnel standpoint, it must have high personnel readiness with a balanced force that includes the right quality and mix of officers and enlisted Marines.¹⁷ It also must have a useful force that has the appropriate Marines (by skill, grade, and experience) at the right place at the right time to generate the capability and combat power needed to accomplish assigned missions. From our analysis of Marine Corps FMOs that are particularly related to compensation and retirement, we identified five that are fundamental building blocks that work independently and collectively throughout all levels of the Marine Corps to achieve a ready, balanced, and useful force that enables the organization to preserve its identity as a premier warfighting organization.

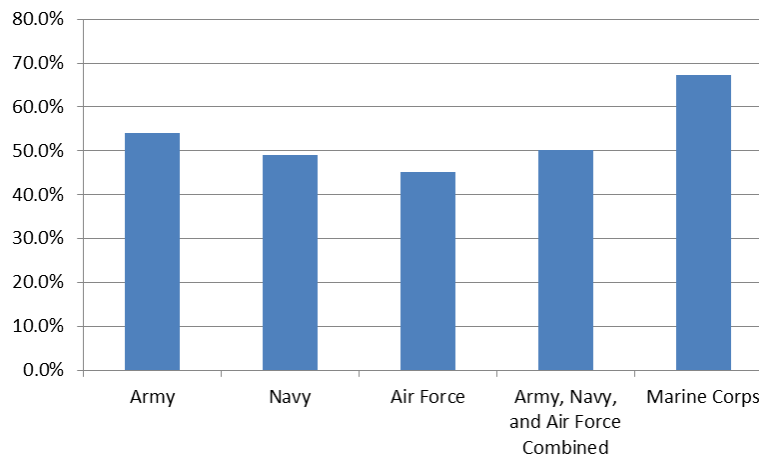
¹⁶ The expression of using war as an "ultimate auditor" of force management policies is borrowed from comments provided to the study team by CNA senior fellow, General James N. Mattis (USMC retired).

¹⁷ This mix also considers the need for nonuniformed personnel (i.e., civil servants and contractors).

A dependable accession pipeline

The Marine Corps must continue to attract high-quality applicants¹⁸ in sufficient numbers and with sufficient diversity to sustain its endstrength and associated skill requirements. In addition, it is important to note that the Marine Corps traditionally has required a higher number of enlisted accessions relative to its force size than the other services because of its comparably more junior enlisted grade structure (as shown in Figure 2). This force mix could have implications for how the blended retirement plan differentially affects service FMOs.

Figure 2. Service E1-E4 AC population percentages



Source: [5]

An additional difference is that the Marine Corps' ratio of enlisted Marines to commissioned officers is notably higher than that for the other services. The Marine Corps has 9.1 enlisted Marines per commissioned officer as compared with 5.2 for DOD, 5.2 for the Army, 5.1 for the Navy, and 4.0 for the Air Force [5].

¹⁸ DOD benchmarks for high-quality enlisted accessions require 90 percent Tier Is (mostly high school diploma graduates), 60 percent scoring at the 50th percentile or above on the Armed Forces Qualification Test (AFQT), and not more than 4 percent scoring at the 30th percentile or below on the AFQT. The Marine Corps' internal goals are 95 percent Tier Is and 63 percent scoring at the 50th percentile or above on the AFQT. Marine Corps officer accessions must have a bachelor's degree and at least a 1,000 combined math and verbal score on the Scholastic Aptitude Test, a 22 on the American College Test, or a 74 on the AFQT.

A healthy and sustainable career force

The Marine Corps must retain top-performing career Marines in the right skills and must ensure that force continuation rates are maintained at levels necessary to achieve the officer and enlisted promotion timing targets in Table 3 and Table 4.¹⁹ This includes having a diverse career force that is capable of retraining for and adapting to emerging skill requirements.

Table 3. Desired officer promotion timing

Paygrade	Commissioned service
Major	9-11 years
Lieutenant Colonel	15-17 years
Colonel	21-23 years

Source: DODI 1320.13 dated Jul. 22, 2009.

Table 4. Desired enlisted promotion timing

Paygrade	Time in service
Sergeant	4 years
Staff Sergeant	8.5 years
Gunnery Sergeant	13 years
First Sergeant/Master Sergeant ^a	17.5 years
Sergeant Major/Master Gunnery Sergeant ^a	22 years

Source: MARADMIN 485/14 (ECFC Program).

^a First Sergeants/Master Sergeants (E-8s) can comprise no more than 2.5 percent of the enlisted force. Sergeants Major/Master Gunnery Sergeants (E-9s) can comprise no more than 1.25 percent of the enlisted force [6].

An appropriate quality of life for Marines and their families

The Marine Corps must set the conditions to ensure that Marines and their families have the opportunity for an appropriate quality of life during their service and are prepared to continue that quality of life as they transition from the Marine Corps. Quality of life is fundamentally important to being able to sustain a dependable accession pipeline and a healthy career force.

¹⁹ Officer promotion timing targets are established by DOPMA with corresponding DOD guidelines, whereas enlisted promotion timing targets are established by the Commandant of the Marine Corps as part of the Enlisted Career Force Controls (ECFC) Program.

Transparent compensation and retirement policies

The Marine Corps must have compensation and retirement policies that are easily understandable by Marines and their families, and that prepare and empower them to make well-informed decisions that will sustain them financially in the short term while also preparing them for long-term financial stability.

An affordable force

Finally, the Marine Corps must be able to pay for personnel without compromising its ability to make needed investment in other priorities (e.g., equipment, facilities, training). These other investments are critical to ensuring that high-quality, first-term and career force Marines have the complementary resources needed to be successful in assigned missions.²⁰

Other service FMOs

We conducted a limited review of other service FMOs. Although all of the services have top-line FMOs that are roughly in line with those that we have identified for the Marine Corps, the relative sizes of the first-term and career forces for the Marine Corps compared with the other services constitute a significant force management difference. As shown in Figure 2, the Marine Corps' E-1 through E-4 AC population constitutes approximately 67 percent of its total AC enlisted force, whereas the other services' E-1 through E-4 AC populations average only 50 percent of their total AC enlisted forces. As such, the Marine Corps' force management actions favor a relatively higher accession mission with lower career force retention requirements than the other services. We must be mindful of these differences as we evaluate how retirement plan changes could have different effects on Marine Corps FMOs than they might have on the other service FMOs.

²⁰ Currently, the Marine Corps' Manpower Programming and Budgeting Section reports that the Marine Corps is unable to fund additional retirement costs without an increase to its total obligation authority unless other program funding is reduced accordingly [7].

MCRMC Blended Retirement Plan Effects on Marine Corps FMOs

When DOD changes the *way* in which servicemembers are paid, potential recruits and servicemembers will rightly perceive a change in the *value* of the compensation package. This perception could be either positive or negative, depending on servicemembers' individual perspectives, and may result in an adjustment in their willingness to join or stay in the Marine Corps.

We expect that changes to individual compensation components will have specific and varying effects on each of the five foundational FMOs (and consequently the overarching ones) that will depend on which servicemembers are affected and how they are affected. In this section, we discuss our hypotheses with respect to these specific relationships. Our analysis of these hypothesized effects will ultimately form the foundation on which we will build our empirical analysis for the follow-on study.

Variations in discount rates and responses to changes in compensation

As we have discussed, the commission proposed that the current military retirement benefit be converted into a blended plan by reducing the pension size by 20 percent, and by adding TSP contributions and a continuation bonus to compensate for value loss of the reduced pension. It assumed that, because this change involves shifting some deferred income to current income, servicemembers will recalculate the total PV of the new benefit relative to the old by using a PDR of 12.7 percent for enlisted and 6.4 percent for officers. Finally, the commission forecasts that the services would be able to maintain the same personnel profile at a lower cost under the new system.

Note that the assumptions of average PDRs for enlisted and officers are critical to the outcomes delineated in the MCRMC report.

To consider the possible range of PDRs, we turn to the literature.

Two papers from Warner and Pleeter serve as the bookends on PDR estimates—that is, they estimate PDRs that are higher than those found in other studies in the first paper and lower than average in their second. In their most recent paper, a 2014 study of servicemembers [8], the authors based their findings on contributions servicemembers made on their own TSPs and the take rates of the military’s Redux bonus take-rates. From these data, they estimate PDRs of 2.0 percent for officers and about 7.0 percent for enlisted servicemembers. These estimates were quite low relative to other studies of PDRs, and especially compared with their first study.

In [9], a paper published in 2001 in *The American Economic Review*, the authors look at data from servicemembers who separated in the military drawdown of the 1990s. Many servicemembers were offered a separation bonus and were further offered a choice between a lump-sum cash payment and an annuity that was based on their rank and YOS. Based on the relative take-rates of the cash payments and annuities by the separating servicemembers, the authors estimated a range of PDRs from 10.4 to 18.7 percent for separating officers and from 35.5 to 53.6 percent for separating enlisted personnel, with an overall average discount rate of about 18 percent. These estimates were quite high relative to other studies.

The authors postulate that the servicemembers’ PDRs were high in the drawdown of the 1990s as a result of fear of possible unemployment in the face of unanticipated career changes, which could have led to a high number of lump-sum takers. The authors suggest that PDRs are at least partially driven by degrees of uncertainty—high uncertainty by separating servicemembers who face unemployment, compared with low uncertainty driven by low degrees of uncertainty for servicemembers contributing to their TSP accounts and taking advantage of the Redux bonuses.

In addition to finding a wide range of PDRs that vary by circumstance and choices, the authors discovered that PDRs vary by individual characteristics, such as age, race, and gender.

Other estimates of average PDRs are 10.5 percent for officers and 12.5 percent for enlisted from a 1984 survey [10] and much less than the 18-percent PDR estimated in [9] based on the percentage of eligible servicemembers who chose the Redux cash bonus retirement plan over the standard High 3 retirement plan from a 2005 CNA study [11]. Another high PDR estimate is 28 percent from a 2002 study of Danish students, which postulated that the relatively small amounts of money being exchanged, along with participant perceptions of a high default risk by the experimenters, may have produced an erroneously high PDR [12].

So, from this small set of studies, two separate studies by the same authors found a range of PDRs from as low as 2.0 percent to as high as 53.6 percent, and multiple other studies estimated a range from 10.5 to 28 percent. Our point here is that there are distributions of PDRs, not just a single PDR.

We caution the reader, however, that we are not disputing the estimates put forth by the commission's report. The method used to estimate average PDRs for officers and enlisted personnel is based on data and the observed behaviors of servicemembers in the data. In addition, the algorithms they used were sound.

What we suggest is this. It is quite likely that PDRs are distributed among servicemembers in ways that could skew estimated outcomes based on an average. For example, if PDRs fall with age, older people will, on average, have lower PDRs than younger people. Since the military has a high proportion of young servicemembers, using an average PDR could badly overestimate the PDRs of older (i.e., career) servicemembers and may cause estimates of their responses to changes in the retirement benefit to be inaccurate.

Market prices versus subjective valuation

Another factor has to do with how servicemembers used PDRs and when it is appropriate to use a subjective PDR versus a market rate in the valuation of certain types of benefits. Consider the lump-sum present valuation of the pension benefit itself. The commission assumes that servicemembers will estimate the PV of the lifetime stream of retirement annuity payments using their own subjective PDRs (i.e., enlisted members will use 12.7 percent and officers will use 6.4 percent). As we saw in the previous section, this results in estimated PVs of the pension that are roughly \$202,500 for enlisted servicemembers and \$716,000 for officers.

But, would servicemembers actually discount a guaranteed annuity in this manner? We consider this question by discussing how annuity markets price guaranteed annuities. We start with a worker who has some money saved and wants to buy a guaranteed annuity. He or she could visit a licensed financial agent, who would offer to provide guaranteed annual (or monthly) payments for a price. So, for example, if this person wants the annuity to be \$25,580 a year, starting at age 39, for the rest of his or her life (like the enlisted pension), the company would price the cost of that annuity at around \$500,000, depending on the going interest rate at the time of the purchase.²¹ This is considerably higher than the \$202,500 estimated by the commission. Similarly, the officer's benefit, if purchased on the annuities market, would cost nearly \$1 million, which is substantially higher than the \$716,000 estimate using the subjective PDR.

²¹ A financial information website estimates that a guaranteed lifetime annuity of \$25,000 costs more than \$500,000, which would suggest a PDR of less than 3.5 percent [13]. Estimates vary from company to company; this example is just for illustration.

So how does the finance company decide on this price? It knows it will need to make future payments, but it too discounts them. It does not, however, discount these payments at 12.7 percent because it takes the worker's \$500,000, invests it, and makes a profit from it. Instead, the firm discounts the payments at a lower rate, the market interest rate of 4 or 5 percent.²²

But what does this imply about how servicemembers value the benefit? Servicemembers can easily compare prices of guaranteed annuities. If they know that they would pay \$500,000 for a guaranteed annuity equivalent to their own pension benefit, they would likely place the value of the military benefit somewhere near that price.²³

The main point, however, is that, in the enlisted case, there is a gap of nearly 150 percent between the \$202,000 valuation using the 12.7-percent PDR, and the \$500,000 valuation using the annuity market price. If a servicemember uses the market valuation, that 20-percent loss in the pension from the old to the new system is more valuable to the servicemember, and the effect on recruitment and retention could be larger than the commission's estimates. The Marine Corps will need to consider these potential effects as it plans force management plans and policies in response to the proposed blended plan.

Note that the issue of valuation via the servicemember's subjective PDR or an annuity market price is of smaller consequence for officers since their estimated PDR is already low at 6.4 percent. In this case, the difference is between a subjective lump-sum PV of \$716,000 and a market price of \$1 million, which generates a roughly 30-percent gap.

We now discuss how the blended plan is expected to affect each of the five foundational FMOs. As in the preceding example, we formulate and consider hypotheses about potential outcomes under the commission's assumptions and how they might differ under other assumptions.

²² The PV of a guaranteed annuity of \$25,580, starting at age 39 and payable until age 85 and discounted at 5 percent is about \$500,000. However, in addition to being guaranteed, the military pension is inflation protected. This could increase the price of that annuity by an additional 25 or 30 percent, depending on future inflation expectations. For ease of illustration, however, we forgo estimating the value of the inflation protection component.

²³ The market price method of valuation may differ from \$500,000 for two reasons. First, there is no market for a military pension, so retirees cannot sell them. Second, because interest rates vary from year to year, annuity prices will too. Nevertheless, if servicemembers use rules of thumb and market information instead of subjective PV calculations, they would discover annuity prices, and, thus, might value the military pension more similarly.

Expected effects on foundational FMOs

As we have discussed, the Corps is concerned that changing the retirement benefit will change the behavior of Marines, and of potential recruits, in ways that could affect force management. We have outlined the Corps' force management objectives (FMOs), and the ways that employers and employees think and respond to various types of compensation. In what follows, we will discuss in more detail the five foundational FMOs, as well as the two overarching FMOs, and the potential effects that retirement reform will have on them.

Assumptions

As we have also discussed, the commission has based its conclusions about the relative valuation of the new retirement benefit and potential outcomes for the services on several critical assumptions about how servicemembers will respond to the changes. We have discussed reasons why these assumptions may or may not hold. Here we will discuss what the outcomes would be for the services whether or not the assumptions hold. The five critical assumptions made by the commission follow:

1. The constant and universal PDRs are as follows: for enlisted, the average PDR = 12.7 percent; for officers, the PDR = 6.4 percent. As we discussed earlier, the commission estimated these averages from the personnel data used in the model used by the commission.
2. Servicemembers will contribute an average of 3 percent of their BP to their TSP accounts. This implies that DOD's contribution will be 4 percent of BP. Here the commission assumed that servicemembers have been automatically enrolled to contribute 3 percent from their BP and that this would continue for the remainder of their careers.
3. Servicemembers will earn an average of 7.3 percent annual nominal returns on TSP savings. Note that, with an expected annual inflation rate of 2.35 percent, this translates to 4.95 percent real annual returns. This came from the historical data on returns on federal employees' TSP accounts.
4. On completing their 12th YOS, enlisted personnel will receive a continuation bonus that is equal to 2.5 months of BP. The commission claims that officers will receive 2.5 percent of BP *plus* some additional amount as determined by their service; however, their total cost estimates are based on 2.5 percent. This estimate follows from the assumptions on PDRs and the amounts that would be needed to compensate for the lost value of the pension benefit.

5. The commission estimates that more than 95 percent of first-term and more than 75 percent of second-term servicemembers will opt in to the new system, even though they are grandfathered into the current system. These estimates came from the commission's survey of servicemembers.

In our analysis of potential effects of the retirement reform on the five FMOs, we will consider the effects under the commission's assumptions and also under various differences in these assumptions.

Dependable accession pipeline

The Marine Corps' accession pipeline is critical to maintaining a ready force. This pipeline creates the flow of personnel from recruitment, through training, to the first permanent assignment. The Marine Corps uses accessions to replace losses and ensure a steady flow of trained and skilled Marines into the career force. How might a reduced retirement benefit, coupled with the addition of a TSP and continuation bonus, change the potential recruit enlistment behavior?

To address this question, we examine the reduction in the pension's PV relative to the increase in PV of TSPs and continuation bonuses for potential recruits. We consider the potential outcomes under the commission's assumptions and different outcomes under various other assumptions about how potential recruits discount future pay.

We have shown that, at the subjective PDRs assumed by the commission, the lump-sum PV of the enlisted pension is around \$202,500 and about \$716,000 for officers. This is the PV of the pension benefit at YOS 20. But, a new recruit would not be eligible for that benefit for at least 20 years. Discounting \$202,500 at 12.7 percent for 20 years implies that the new recruit would estimate the benefit's PV at around \$18,500 *at accession*. This is a fairly low value for a benefit that would be worth over \$200,000 at retirement.

An officer candidate whose estimated PDR is only 6.4 percent would place the PV of a \$716,000 benefit in 20 years at about \$207,000 at accession. This is far less than the pension's PV at YOS 20, but still a considerable sum.

The reformed pension will be 20 percent less than the current pension. That would make the lost pension's PV around \$3,700 for a potential enlisted recruit at accession. For a potential officer recruit, the lost benefit's PV, at a 6.4-percent PDR, would be around \$41,000.

Given that, under these assumptions, an average enlisted recruit would perceive the value of the lost benefit to be around \$3,700, would the PV of the TSP contributions and the YOS 12 continuation bonus be enough to replace that lost value?

Using the formula for the TSP contributions from our section on TSPs, we calculate the FV of DOD's TSP contributions, which is 4 percent of base pay for YOS 3-6 (assuming a six-year, first-term enlistment)²⁴ and which earns 7.3 percent per year, to be about \$5,700. Discounting this FV by 12.7 percent annually back six years to accession, gives us an estimate of about \$2,780.²⁵ In addition, the potential continuation bonus the Marine Corps will pay at YOS 12 will be about \$10,000 for a mid-career enlisted member. Discounted back 12 years, to recruitment, the continuation bonus would be valued at around \$2,400. As a result, the PV of the TSP plus YOS 12 continuation bonus will be around \$5,180, which is more than the PV of the lost pension benefit (which we estimated at around \$3,700).

Thus, for the typical enlisted recruit, the PV of the TSP contributions plus the continuation bonus may be enough to compensate for the value of the lost pension benefit. This is a simple set of calculations based on assumptions about the PDR and what we expect will be the amounts the average Marine receives in TSP contributions and continuation pay.

Now, we consider the typical Marine officer whose estimated PDR is only 6.4 percent. Recall that he or she would, at that rate, calculate the lump-sum PV of the pension at retirement to be around \$716,000. Discounted by 20 years to the time of accession would place the lump sum PV at about \$207,000.²⁶ In this case, the 20-percent pension reduction would place the *value of the lost benefit* at roughly \$41,000.

Would the TSP and the continuation bonus replace this lost benefit for officer candidates? The average Marine officer who contributes 3 percent of base pay will receive 4 percent in DOD contributions and, at a 7.3-percent annual ROI, have \$11,600 by YOS 6. At a 6.4 percent PDR, the PV would be \$8,000 at accession.

The commission proposes that DOD provide about 2.5 months of base pay as an incentive to continue in service from YOS 12 to YOS 16. This is a relatively small amount, perhaps \$18,000. Discounted at 6.4 percent for 12 years (back to accession), the PV would be roughly \$8,600. As a result, for the typical officer candidate, the combined value of the TSP contributions and YOS 12 continuation bonus would be

²⁴ Most Marine recruits sign up for 4-year rather than 6-year enlistments. We use this example to illustrate our point. It should not change our basic results. In our follow-on study, we will model enlistment lengths proportionately in accordance with the data.

²⁵ The recruit is estimating the PV of the FV of DOD's TSP contributions. This calculation is:

$$\frac{\sum_{y=1}^6 (0.01) \cdot BP_y \cdot (1+ROI)^y + \sum_{y=2}^6 (0.03) \cdot BP_y \cdot (1+ROI)^{y-2}}{(1+d)^6}.$$

²⁶ Notice the coincidental similarity between the PV of the enlisted pension benefit *at YOS 20* (\$202,500) and the PV of the officer pension benefit *at accession* (\$207,000).

\$16,600 (\$8,000 + \$8,600), which is inadequate to compensate for the \$41,000 in lost pension benefit.

The commission also proposes that individual services provide an additional continuation bonus to make up any difference. We estimate that, at 10 months of base pay (versus 2.5 months), the YOS 12 bonus would be roughly \$72,000. Discounting back 12 years would make it worth roughly \$34,000.²⁷ This, combined with the \$8,000 in the TSP account, could be enough to compensate for the lost pension.

The commission's report essentially says that, at these PDRs and these subsequent valuations of the lost pension benefit, the military could achieve current recruitment levels by providing the following: (a) 4-percent annual TSP contributions to both enlisted members and officers, (b) 2.5 months of a base pay continuation bonus at YOS 12 for enlisted members, and (c) 10 months of continuation bonus for officers at YOS 12. This scenario, however, assumes that servicemembers estimate the lump-sum PV of the pension using their own subjective PDR. As we discussed in the previous section, they may instead use the market price to estimate this value. As we saw at the market price, the pension's PV is more than double for enlisted (\$500,000 versus \$202,500) and more than 30 percent higher for officers (\$1 million versus \$716,000).

If potential recruits use the market price, this becomes a different discussion. At the market rate, the TSP and continuation bonuses proposed by the commission would not nearly compensate for the lost pension amount. Instead, the Marine Corps would need to raise the YOS-12 continuation bonus to perhaps 7 or 8 months of base pay for enlisted members, and to 14 or 15 months of base pay for officers to sustain the current accession pipeline.

It is possible that servicemembers do not estimate the lump-sum pension's PV using their own subjective PDRs. The military pension is the same as a lifetime annuity, and lifetime annuities are abundant in financial markets. Reliable information about the market prices of these financial instruments is easily found and verified. As a result, servicemembers may use the market price of lifetime annuities in place of their own personal calculations.

²⁷ The commission estimates that the Marine Corps would need to pay officers a 12-YOS bonus of 11.7 months of basic pay. It reports this on page 34, in footnote 101. Using our simple algorithms, we estimate that the Marine Corps would need to pay 10 months of basic pay. However, we may find a slightly different estimate with our more sophisticated model in the follow-on study.

It is also possible that, under the commission's assumptions about servicemembers' PDRs and how they will contribute to their own TSPs, the new system will have little to no effect on enlisted recruitment. In addition, by increasing the 12-YOS bonus to 10 months versus 2.5 months, the Marine Corps could sustain current officer recruitment levels. As we have shown, however, there is evidence that PDRs change with age and with the delay in future payments. If PDRs decline with age, we expect that accessions could be easier for the Corps. These details would cause us to modify the estimates of potential outcomes, relative to the commission's estimates, and make the sustainability of the Corps' current accession rates less certain. Our follow-on analysis will help the Marine Corps to appropriately gauge how recruitment would change as we vary these important assumptions.

Healthy and sustainable career force

The Marine Corps' career force supplies the advanced skills, leadership, and vision that contribute to Marine Corps warfighting excellence. The health of the Marine Corps' career force depends, at least in part, on the extent to which military compensation provides incentives that motivate Marines to make a career of the Corps. It is possible that retirement changes could change these incentives, altering retention rates in ways that can hurt career force sustainment.

The question ultimately becomes whether the Marine Corps can sustain the career profiles generated under the current retirement system, or whether it will have to make adjustments under the proposed system. To help answer this question, we analyze the effect of changes in the retirement value for Marines who are considering reenlistment at various career points. We consider how PVs differ based on changes to distant future payments versus near future payments versus current payments.

Using a set of simple algorithms, we estimate the difference in PV of the lost pension and DOD's TSP contributions and potential YOS 12 continuation bonuses at various decision points, specifically YOS 6 and YOS 12. We choose these to illustrate how we generate hypotheses about what effects reform will have on retention, and what decisions the Marine Corps may need to make.

Consider a typical enlisted Marine who has reached the end of his or her first term and is considering whether to reenlist. Under the current retirement system, he or she would estimate the lump-sum PV of the pension and then discount that by his or her PDR for the number of years until YOS 20.^{28, 29} The Marine still would do so under

²⁸ Most servicemembers do not strictly solve these calculations before making relevant decisions. Instead, they tend to use rules of thumb, market information, and, to some extent, gut feelings about how they value the military pension relative to their next best choice.

the proposed plan; however, the pension would be 20 percent smaller and would be accompanied by the TSP and a continuation bonus at YOS 12.

Recall that, under the current system, the lump-sum PV of the enlisted pension benefit is \$202,500 (\$716,000 for officers). An enlisted Marine at YOS 6 with a PDR of 12.7 percent would discount that lump sum by 12.7 percent for 14 years, and would consequently perceive the pension's value to be about \$38,000. (Compare that with the typical Marine *recruit* from our previous section, who would value the current pension at about \$18,000). Under the proposed plan, that pension would be worth 20 percent less, or roughly \$30,400, which is about \$7,600 less.

Would the TSP contributions and continuation bonus make up for that \$7,600? We estimate that, for the average enlisted Marine, the FV of the TSP contributions during YOS 7-12 would be about \$14,250. Discounted back 6 years at 12.7 percent, it would be worth about \$7,000. We estimate that the YOS-12 continuation bonus would be about \$8,125. Discounted back 6 years to YOS 6, it would be worth about \$3,965. For enlisted Marines considering reenlistment at YOS 6, the PV of the TSP plus the continuation bonus equal about \$10,965, which appears large enough to compensate for the lost PV pension benefit of \$7,600.

Recall, however, the assumptions needed to obtain this result. First, enlisted Marines have a 12.7-percent PDR and not only discount future payments by this rate but also calculate the lump-sum PV of the pension annuity using this rate. In addition, the commission assumes that servicemembers contribute 3 percent of base pay money into the TSP to receive 4-percent contributions from the service.

If the PV of the pension benefit were estimated using the market price of an annuity, the lost pension PV could be as much as \$18,700—substantially greater than the estimate of \$7,600, in which case the combined TSP and continuation bonus would not compensate for the loss. Similarly, if the servicemembers used the market rate for estimating the value of the pension, *and* if their PDRs were lower, the lost pension's PV would be even higher, and the PV of the TSP and continuation bonus again may not compensate for the loss.

For officers, the story is different. The commission assumes that officers have relatively small PDRs compared with enlisted Marines, meaning they place a higher value on the pension. For officers, we estimate that the lost pension's PV would be

²⁹ Servicemembers also may consider the probability of actually making it to YOS 20. Among Marines, there are those who believe that they will certainly qualify; they would assign a probability of one. Others may believe that there is no chance of making the Marine Corps a career; they would assign a probability of zero, and assign no value to the retirement benefit. Most, however, lie somewhere in between.

about \$60,000. The TSP PV would be about \$18,500 and the continuation bonus PV at 2.5 months of base pay would be roughly \$10,500 making the total worth about \$29,000. This would not compensate for the lost pension. However, if the continuation bonus were raised to 10 months of base pay, the bonus PV would be about \$41,500; combined with the \$18,500 TSP value, it could be enough to compensate for the PV of the lost pension.

These calculations are derived from simple algorithms to illustrate the types of considerations the Marine Corps will need to make to plan its career force sustainment strategies. If the commission's PDR assumptions are correct, then, for enlisted personnel, the value of the TSP at 4 percent of base pay DOD contributions along with 2.5 months of base pay for a continuation bonus could be enough to compensate for the loss of the pension's value for the typical Marine considering reenlistment at YOS 6.

For officers, however, the TSP and 2.5 months of continuation bonus may not be enough. If, however, the continuation bonus were raised to 10 months of base pay, it could be enough. In its report, the commission suggests that the Marine Corps might need to pay a higher continuation bonus to officers than the 2.5 months in the commission's proposal. Our preliminary analysis also suggests that 2.5 months of pay may not be sufficient.

What about servicemembers at YOS 12? We estimate—as does the commission—that a typical enlisted Marine at YOS 12 who estimates the lump-sum PV of the pension benefit using a 12.7-percent PDR would estimate the value of the pension benefit at retirement at about \$202,580; discounted back 8 years to YOS 12 would place its value at roughly \$77,800. As a result, the 12-YOS Marine would value the 20-percent lost benefit value at about \$15,560.

The PV of the expected DOD TSP contribution of 4 percent of base pay over the next 4 years is about \$8,800, and the continuation bonus of 2.5 months of base pay is roughly \$10,000. Combined, they should compensate for the lost pension and persuade the Marine to stay in the Corps for one more term. In addition, it is generally believed that, once a Marine makes it to YOS 16, he or she will almost assuredly stay until YOS 20.

Recall that a typical officer at YOS 12 who uses a 6.4-percent PDR would estimate the lump-sum PV of the pension benefit at about \$716,000. Discounted back 8 years to YOS 12 would place the value at around \$436,000. As a result, the 20-percent *lost value* under the new system would be valued at roughly \$87,000. The discounted PV of DOD's TSP contribution for the next four years would be valued at almost \$21,000. As we stated earlier, the YOS-12 continuation bonus of 2.5 months of base pay would be about \$18,000. Thus, the combined values of the TSP and continuation bonus would be only about \$39,000, against the lost pension value, which is \$87,000. But again, a continuation bonus of 10 months of base pay for the average YOS-12

officer would be closer to \$72,000, making the combined TSP and continuation bonus about \$93,000, which is much closer to the lost pension's value.

Two factors make this picture uncertain. First, as we have previously stated, Marines may not use a subjective PDR to estimate the lump-sum PV of the pension at retirement. They may instead value the benefit using information about the market price of a guaranteed annuity. Second, if mid-career Marines, as a result of getting older and wiser, have lower PDRs than they did as young Marines, the value of the lost benefit could be substantially higher than \$15,560 for enlisted Marines and \$87,000 Marine officers. In that case, the TSP and continuation bonuses might not be high enough to retain these Marines.

Our discussion assumes that, at the margin at least, the value of the current pay structure is what attracts Marines to stay past YOS 12; however, if PDRs actually do fall with age, and/or if Marines use market prices rather than PDRs to estimate the benefit's value, the Marine Corps might need to pay much larger continuation bonuses than the commission recommends. Alternatively, the Marine Corps could choose, rather than pay higher bonuses, to allow a lower retention rate, which could result in a more junior force. Although a younger force is more affordable, it also would likely be less capable.

Appropriate quality of life for Marines and their families

Marines join and stay in the Marine Corps for many reasons. Professionalism, adventure, patriotism, honor, and esprit de corps, are a few important ones. An often unspoken, but equally critical reason, is that the Marine Corps provides an acceptable quality of life for Marines and their families. By quality of life, we mean the ability to live in good neighborhoods, send children to good schools, keep families safe, and buy the things needed for day-to-day living. This is why people work and why the income that they earn over their careers is important.

In economic terms, we refer to the purchase of these goods and services that help to create a good quality of life as "consumption." Consumption is a more complex term than income. It refers to what people buy with their incomes net of taxes, savings, and local costs of living. People care about current and future consumption. Consequently, when we assess the effect of retirement reform on quality of life, we look at how yearly and lifetime consumption will change as a result.

We can analyze relative expected consumption over the life of a typical career servicemember before and after retirement reform. In this way, we are defining "lifestyle" by measuring the typical servicemember's ability to buy things. For example, with the TSP, servicemembers receive payments from DOD into an account that is saved until sometime in the future. These contributions, however, depend on the size of the contributions that the servicemembers make to their own accounts.

This is savings and future consumption; but also it reduces current consumption by the amount that they contribute to the TSP, at least for the first 12 years of active service. Then, the continuation bonus provided at 12 YOS, an additional cash payment, will allow those servicemembers to make up for their TSP contributions for the period from YOS 12 to YOS 20.

On one hand, those who make it to retirement will receive a smaller pension than under the current system. On the other hand, they will have TSP savings, the size of which will depend not only on the size of their contributions but on the market's performance over time.

Ultimately, the proposed plan may increase, reduce, or leave unchanged post-retirement consumption. The commission has estimated that the average servicemember will contribute 3 percent to the TSP each year and, as a consequence, enlisted servicemembers will have an account worth roughly \$70,000 at YOS 20 (an average officer will have more than \$137,000 saved in the account). In theory, these amounts are large enough to replace the lost pension in the new system (20 percent of the current system's pension), if the commission's assumption of 7.3-percent returns on investment holds.³⁰ In practice, however, to actually replace the lost pension each year in consumption would necessitate withdrawing the account's returns each year. Any withdrawals before age 59½ would not only be taxed as regular income but would be penalized for early withdrawal. This would limit the actual amount the retiree could use for consumption and would thus reduce annual consumption below that of the current pension system.

The second part is the continuation bonus at the end of 12 YOS. In the commission's plan, this amount is projected to be 2.5 months of base pay, which is roughly 21 percent of annual base pay. If a typical 12-YOS enlisted member's basic pay is \$45,000, the bonus would be \$9,375. Again, if the return on this were 7.3 percent as the commission assumes, this amount would theoretically replace most of a Marine's lost consumption due to his or her own TSP contributions until he or she reaches retirement eligibility. As we stated earlier, the typical officer's continuation bonus at 2.5 months of base pay would be about \$18,000. At an annual return of 7.3 percent, annual withdrawals from this bonus could in theory replace the lost consumption due to TSP contributions.

From our analysis, we tentatively conclude that servicemembers' total consumption likely will fall as a result of retirement reform. This is because DOD's TSP contributions depend on servicemembers' own contributions, which will reduce

³⁰ The annual return of 7.3 percent on \$70,000 is roughly \$5,100. As we discussed earlier, the lost pension from the current system is 20 percent of about \$25,280, or \$5,056. Note, however, that the pension is inflation protected, while the TSP accumulations are not.


consumption, and because retired Marines would need to make annual TSP withdrawals to match what they would have received under the current pension system.

Of course, if Marines make higher TSP contributions (e.g., 5 percent of base pay instead of the 3 percent assumed by the commission), DOD's contributions will be much larger, and the consequent total savings at YOS 20 will be higher as well. This would further reduce total consumption during the active-duty years but could increase consumption after retirement.

If changes in total lifetime consumption can adequately describe changes in quality of life for Marines, then, based on the commission's assumptions about how much Marines will save in their TSP accounts and how much they will receive in continuation bonuses, we can state the following: It is likely that total lifetime consumption will fall somewhat for the average Marine as a result of retirement reform.

The reasons are fourfold. First, consumption would fall in active service years 1-12 because of the servicemembers' own contributions to the TSP account (see Figure 3). Second, continuation bonuses servicemembers should be large enough to make up for the TSP contributions. Third, for the years immediately following retirement, servicemembers can only make up the difference between the current and reformed pension by withdrawing from their TSP accounts; however, withdrawals of accumulated savings would be penalized if taken before age 59½, reducing annual consumption in the early years of retirement. Finally, retirees 59½ and older will no longer be penalized for withdrawing from their TSPs and, thus, will be able to consume equally under the current and reformed pensions. They might even have higher consumption in their old age (after age 59½) if they had not withdrawn much before old age.

Figure 3. Consumption under new retirement system compared with current system



<u>YOS 1-12</u> Consumption is less under the new system due to servicemember contributions to TSP	<u>YOS 12-20</u> Consumption is roughly equal under the new system due to continuation bonus	<u>Retirement to age 59½</u> Consumption is less under the new system because withdrawals from the TSP before age 59½ are penalized	<u>After age 59½</u> Consumption is equal under the new system because TSP withdrawals are not penalized
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Transparent compensation and retirement policies

It is important for servicemembers to understand their compensation and retirement package so that they and their families can make sound financial decisions. The package should be well structured and comprehensible with clear documentation about what it contains and what the servicemember must do to earn it.

The proposed plan is more complex than the current plan, so servicemembers and the services should invest in ensuring that it is well understood throughout the force. To assess the transparency of the military's compensation system, we consider the sources that servicemembers have for retrieving information about the compensation package. First, our assessment is that the *Marine Corps Times*, other DOD periodicals, and the mainstream media have provided significant coverage and discussion of the new plan that we believe are understandable and helpful to servicemembers and their families.

For those who want a deeper understanding, detailed technical information is available online. For example, information about servicemember eligibility for retirement is contained in 10 U.S. Code § 12732, "Entitlement to Retired Pay: Computation of Years of Service," which we located on the Cornell Legal Institute website at <https://www.law.cornell.edu/uscode/text/10/12732>.

Finally, as part of this reform proposal, DOD will require that all servicemembers attend a personal finance course to improve their financial literacy. Its primary objective is to enhance servicemembers' ability to fully understand their TSP options, especially with respect to their own and DOD's contributions. In addition, it should enhance servicemembers' ability to make good investment decisions with the money in their accounts. Although not the primary reason for the course, it also is likely that it will enhance servicemembers' abilities to understand the components of the proposed plan.

DOD has many resources from which servicemembers can get information about the various components of their compensation package. This information includes not only the dollar amounts of each component but also eligibility requirements, changes over time, and comparisons of military and civilian income. In addition, DOD requires the services to provide individual servicemembers with financial advice about the opportunities available to them and the decisions required of them.

The quantity and quality of communication forums suggest that DOD believes that more information is better. We agree and think that this is an important part of strengthening trust between servicemembers and the services; however, we also believe that financial literacy training should make clear that the valuations contained in the commission's proposed plan are highly dependent on assumptions that may not apply to each servicemember or be consistent with market information.

We believe that the commission and the services need to be more explicit about how and why these assumptions were made, and under what conditions they will vary among servicemembers and over time.

This is especially important when estimating the value of the new retirement system relative to the old. For example, the commission estimated that the lump-sum PV *at YOS 20* of the old system is around \$202,000 for enlisted, making the loss only about \$41,000. As we've seen, however, the market price for an equivalent lifetime annuity suggests that the true value could be much higher, perhaps as much as \$500,000, which—if correct—would make the loss closer to \$100,000.

Affordable force

A critical consideration for retirement reform is how it will affect the cost of the force. Under the current system, more than \$16 billion is set aside each year as MRTF accruals. Reducing that portion of compensation costs by 20 percent would, in theory, save DOD \$3.2 billion in annual accruals. To maintain recruitment and retention levels, the commission's plan provides for TSP contributions and continuation bonuses to mid-career servicemembers.

The MCRMC predicts that DOD personnel costs will decline as a result. Its specific estimate is that annual costs will fall by about \$1.9 billion after all personnel are on the new plan [1], implying that the amount the services would need to compensate servicemembers for the lost pension benefit would be about \$1.3 billion. So, why would servicemembers need only \$1.3 billion in TSP contributions and continuation bonuses to compensate for \$3.2 billion in lost pensions? The gaps, as we noted in the section on discounting, come from the fact that pensions occur far in the future and, thus, are heavily discounted. TSP contributions and continuation bonuses, although future payments, are paid much earlier, so they are less heavily discounted.

Total cost differences depend critically on assumptions about servicemembers' subjective PDRs, how much servicemembers will contribute to their TSPs, how much continuation bonuses will be needed to maintain retention, and the number and speed with which grandfathered servicemembers choose to opt in to the proposed plan.

The primary relevant assumptions in the commission's cost models include the following:

- The commission generates results for which YOS profiles will remain as is for each of the services, but these are based on the commission's assumptions about average PDRs among enlisted servicemembers and officers, which generate the result that the PV of total compensation will be relatively constant under both systems.

- The commission's estimates of total costs and potential savings are based on YOS-12 continuation bonuses of 2.5 months of base pay. The commission itself, however, suggests that the services will probably need to provide larger bonuses, perhaps 10 months of base pay or more, to keep retention at current levels.
- The commission forecasts that the average servicemember will contribute 3 percent to his or her TSP account, meaning that DOD will contribute an average of 4 percent of total base pay, 1 percent in automatic payments, and 3 percent in matching payments to the TSP accounts.
- The commission's surveys suggest that over 90 percent of first-term servicemembers and nearly 75 percent of second-termers will opt into the proposed plan in the first year.

What if these assumptions are not accurate? As we previously discussed, there is strong evidence that PDRs, for example, are high at youth and fall with age. If so, the PV of the lost pension benefit could be quite low for first-term servicemembers yet large enough at later YOS that the proposed continuation bonus might not nearly compensate for the loss. In this case, the services may need to pay larger continuation bonuses, which will reduce potential savings.

For example, we estimate that there are about 6,200 military officers at YOS 12, each earning about \$85,000 in base pay. A bonus of 2.5 months of base pay would be about \$17,850. Multiplying that times 6,200 officers is about \$111 million in continuation bonuses. If, as we suggest in the previous section, the services need to give 10 months of base pay to maintain retention rates, bonuses would be about \$70,800, and total costs to the services would be \$439 million, reducing total potential savings by about \$328 million, or about 16.5 percent of total projected savings. For the Marine Corps, with roughly 650 officers at YOS 12, bonuses would cost \$11.6 million for the smaller bonus and \$46 million for the larger bonus.

In addition, if, as a result of varying PDRs, the PV of the new benefit does not result in the same YOS profile, the costs of paying servicemembers would differ from estimates. For example, if the resulting profile had greater pay longevity, the cost of paying servicemembers could rise since more senior servicemembers have higher wages. Of course, if the resulting profile had less pay longevity, the cost of wages would fall.

The commission forecasts that the average servicemember will contribute 3 percent of base pay into their TSP. The maximum contribution, however, is 5 percent. Furthermore, DOD will set the default rate to 3 percent, meaning that it will automatically begin deducting 3 percent of servicemembers' basic pay, and only after the servicemember takes a personal finance course will he or she be allowed to change the automatic deduction. The question is this: what *will* servicemembers do

after they take the course? Will most stay at 3 percent? How many will reduce or increase the deduction? The commission assumes that the number selecting less than or more than 3 percent will be such that the 3-percent average is maintained.

To assess the risk in this assumption, consider the difference in savings if the average servicemember's contribution turns out to be 4 percent, rather than 3 percent. In 2015, total DOD-wide base pay was \$52 billion. One percent of that is \$520 million, which is more than 25 percent of projected savings. For the Marine Corps, whose total base pay in 2015 was \$6.3 billion, a 1-percent difference in savings is \$63 million—a substantial savings reduction for the Marine Corps.

We have provided two plausible scenarios in which potential savings, at the steady state, are nearly \$1 billion less than the commission estimates, just because of differences in servicemembers' behaviors regarding their TSP contributions and the size of the continuation bonuses for officers at YOS 12. If it also is the case that servicemembers discount the pension benefit at the market rate, rather than the subjective PDR, or if PDRs change over time among individuals, potential savings could be even less or possibly zero.

Our intent is not to devalue or criticize the commission's analysis because its estimates are quite plausible. To even consider retirement reform, the commission needed to make some assumptions about how servicemembers would respond and how much the reform would cost the services. Because these are just assumptions, however, the services need to be prepared to respond to actual servicemember behavior, regardless of whether these assumptions are accurate.

The Marine Corps' overarching FMOs

Ready, balanced, and useful force

In previous sections, we described the five foundational FMOs that work individually and collectively to support the Marine Corps' overarching objective of a ready, balanced, and useful force. If the Marine Corps' accession targets are not naturally met under the proposed plan (i.e., if the relative PV of total compensation under the proposed plan is less than under the current plan), the Marine Corps will need to decide whether to spend more on recruitment. On one hand, this will raise costs and risk the Marine Corps' ability to achieve other important objectives. On the other hand, to accept fewer accessions would risk a shortage of trained Marines in future years. Furthermore, under this scenario, the Marine Corps would need to raise its retention targets in future years in order to maintain its required career force.

Similarly, if the Marine Corps' retention targets are not naturally met under the proposed plan, the Corps would need to either increase retention bonuses or allow

retention to fall. If it spends more on bonuses, those higher bonus costs could risk achievement of other objectives, but allowing the career force to shrink could jeopardize readiness. If the Marine Corps allows retention to fall, it would need to increase accession targets, which could raise recruitment and training costs and result in a more junior, less experienced force.

Either scenario could change the force balance by changing the relative seniority of the Corps' personnel profile. The costs to mitigate these changes could have significant second-order effects if higher personnel costs reduce investment in other parts of the DOTMLPF resource base.

Organizational identity centered on warfighting excellence

Ultimately, any policy change that affects Marines must be crafted and communicated in a way that is consistent with the Marine Corps' overarching objective of preserving its cultural identity as a premier warfighting organization. Much of the discussion on the proposed system will revolve around costs, personal finances, and effects on the Marine Corps manpower system. Leaders must be prepared, however, to go beyond programmatic explanations to answer the timeless question, "How will this new retirement plan make us a better warfighting organization?"

This is a fair question, one that the Marine Corps should dedicate significant effort to answering as it prepares to roll out its information campaign on the proposed plan. Although the plan may have significant benefits for the individual Marine, for his or her family, and for the Marine Corps, we contend that the first discussion point should be to explain to Marines how the proposed plan is connected to creating a more ready, balanced, and useful Marine Corps that can preserve or enhance its organizational identity of warfighting excellence.

Summary results

In Table 5, we summarize our analysis of expected results.

Table 5. How changes to commission assumptions might affect key FMOs

Assumptions	Descriptions of assumptions	What if the reality is higher than the estimate?	What if the reality is lower than the estimate?
PDRs	<ul style="list-style-type: none"> Enlisted PDR = 12.7 percent Officers PDR = 6.4 percent 	<p>If PDRs are higher for younger people:</p> <ul style="list-style-type: none"> Value of lost pension low relative to the gains from TSP and continuation bonus Could <i>positively</i> affect potential recruitment. 	<p>If PDRs are lower for <i>older</i> servicemembers:</p> <ul style="list-style-type: none"> Value of the lost pension high Could <i>negatively</i> affect retention Services may need to raise continuation bonus to meet retention goals Higher personnel costs
TSP contributions	Average DOD contribution of 4 percent of basic pay (BP)	<ul style="list-style-type: none"> Cost to services for TSP contributions are higher Potential savings lower Higher accumulated savings at retirement Less consumption during active service 	<ul style="list-style-type: none"> Lower cost to the services Greater potential savings Servicemembers will have more to spend while active, but lower accumulated savings at retirement
Return on investment (ROI)	Investments in TSP accounts earn 7.3 percent nominal annual returns	<ul style="list-style-type: none"> Accumulated savings will be larger than estimated Saving into the TSP will be a better deal for servicemembers Potentially positive for retention and recruitment 	<ul style="list-style-type: none"> Accumulated savings will be lower at retirement TSP will be considered less of a good deal Risk to retention and accession rates

Assumptions	Descriptions of assumptions	What if the reality is higher than the estimate?	What if the reality is lower than the estimate?
Continuation bonus	<ul style="list-style-type: none"> Enlisted: 2.5 months of BP at YOS 12 Officers: 2.5 percent of BP plus additional amount that services determine 	<ul style="list-style-type: none"> Potential savings to DOD will be less than the commission's estimates 	<ul style="list-style-type: none"> Probably will pay exactly 2.5 months of BP Potential savings will not differ from commission's estimates
Opt-in rate	Opt-in rates in the first year: <ul style="list-style-type: none"> 95+ percent of first term 75+ percent of second term 	<ul style="list-style-type: none"> Shorter time to enroll all servicemembers into new system Expected savings will accrue faster 	<ul style="list-style-type: none"> Would take longer to enroll all servicemembers Potential savings would not accrue as fast as commission's estimates

Source: MCRMC report and CNA analysis.

A Framework for Further Analysis

In this section, we discuss the objective of our follow-on analysis, the detailed analytic methods that we expect to use, the types of data that will be needed, the assumptions that we will subject to sensitivity analysis, the range of possible scenarios that we will empirically model, and the internal adjustments that may be necessary to mitigate negative effects of the proposed retirement reforms.

Objective

The objective of our detailed follow-on analysis is to estimate the range of possible effects of retirement reform on Marine Corps personnel YOS profiles, costs, and related FMOs.

Analytic methods

CNA simulation model

We will use a personnel-retention and cost-simulation model in our follow-on analysis. The model will allow us to estimate the effects of retirement changes on Marine Corps personnel YOS profiles, costs, and related FMOs. The model is based on the theory that compensation, including the value of the retirement benefit, and retention rates are related in a relatively straightforward way.

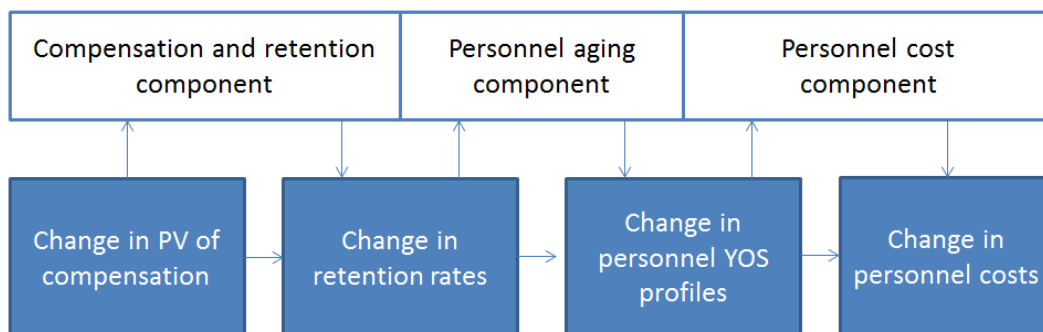
In short, the CNA simulation model uses Marine Corps personnel data to estimate average personnel inventories and retention rates by paygrade and YOS. For a given retirement reform policy, we will use a series of algorithms to estimate changes in the value of career military compensation and retention under various assumptions about PDRs and the distribution of wage retention elasticities. We will apply these results to our personnel aging model to estimate the short- and long-term effects of retirement reform on personnel YOS profiles, compensation costs, and FMOs.

We will model the effects of retirement reform on enlisted Marines and commissioned officers in both the AC and the RC.

The mechanisms through which retirement reform affects personnel YOS profiles and costs (the effects on FMOs were described in a previous section) fall under three CNA model components (see Figure 4):

- *Compensation and retention:*
 - The retirement benefit affects career military compensation.
 - Career military compensation affects retention rates.
- *Personnel aging:*
 - Retention rates affect personnel YOS profiles.
- *Personnel cost:*
 - The retirement benefit directly affects personnel costs.
 - Personnel YOS profiles affect personnel costs.
 - Changes to the number of retiring servicemembers affect personnel costs.
 - The use of continuation bonuses—to minimize the effect on personnel YOS profiles—affects personnel costs.

Figure 4. Flow diagram of simulation model



We describe each component in turn.

Compensation and retention component

The first component of CNA's simulation model is a compensation and retention component. We first calculate baseline (i.e., current) and blended plan retirement

annuities with multipliers of 0.025 and 0.02, respectively. Then, we calculate total career military compensation, which is the discounted sum of career wages and the retirement benefit, for both the baseline and blended retirement plans. Finally, we calculate the percentage change in the PV of total career military compensation after what amounts to a 20-percent reduction in the retirement annuity, and the retention effects by multiplying the percentage change in total career compensation by the wage elasticity of retention.

The baseline of the retirement annuity paid from retirement until the retiree's death using YOS at retirement is A_1 :

$$A_1 = 0.025 * \text{High_3 BP} * \text{YOS} \quad (6)$$

The baseline of the retirement annuity in the blended plan to be paid from retirement until the retiree's death using YOS at retirement is A_2 :

$$A_2 = 0.02 * \text{High_3 BP} * \text{YOS} \quad (7)$$

If we continue with the commission's assumption of zero expected inflation throughout the entire retirement, the lump-sum PV of the retirement annuity at YOS 20 (described in equation 1b) would be $PV(A)$:

$$PV(A) = \sum_{t=1}^T \frac{A}{(1+d)^t} = \frac{A}{d} * \left(1 - \frac{1}{(1+d)^T}\right), \quad (8)$$

where:

d = the servicemember's real PDR

T = the number of years that servicemembers expect to collect a military retirement annuity.

The PV of the FV of the Thrift Savings Plan at the career decision point for servicemembers who plan to stay until retirement is $PV(FV(TSP))^{31}$:

$$PV(FV(TSP_{YOS=y})) = \sum_{t=1}^{20-y} \frac{TSP_{y+t}(1+ROI)^{21-y-t}}{(1+d)^{20-y}}, \quad (9)$$

³¹ Note that Equation 10 is different from Equation 6. Equation 10 is calculated for a servicemember at a certain YOS who plans to stay until retirement, whereas Equation 6 is for a servicemember who is evaluating the PV of the TSP at the beginning of a new term. Both are correct for different types of individuals.

where:

ROI = the return on investment.

The PV of the 12-YOS continuation bonus for servicemembers at the career decision point is $PV(CB)$:

$$PV(CB_{YOS=12}) = \frac{CB_{12}}{(1 + d)^{12-YOS}}, \quad (10)$$

where:

CB = the continuation bonus

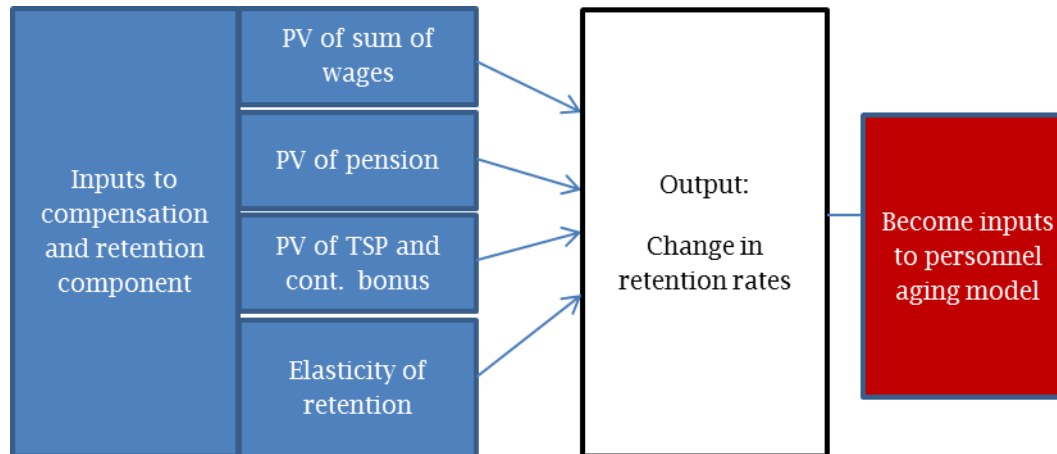
$(12 - YOS)$ = the number of years until continuation bonus receipt.

Change in total compensation

The first mechanism in the compensation and retention component is the effect of retirement reform on career military compensation. Retirement reform affects career military compensation by changing the PV of total career military compensation and the mix of current and deferred pay.

Figure 5 shows the inputs and outputs of the compensation and retention component. This component's outputs become inputs to the personnel aging component (the second component of CNA's simulation model).

Figure 5. Inputs and outputs of compensation and retention component



Career military compensation under the existing retirement plan, for a servicemember at a certain YOS, is $PV_I(Y_{YOS=y})$:

$$PV_1(Y_{YOS=y}) = \left[\sum_{t=1}^{20-y} \frac{W_{(y+t)}}{(1+d)^t} \right] + \left[\frac{PV(A_1)}{(1+d)^{20-y}} \right]. \quad (11)$$

This equation is the sum of annual wages, discounted by the PDR in each year, plus the PV of the existing retirement pension, where:

W_t = the military wage at YOS_t, equals the sum of basic pay, basic allowances for housing and subsistence, and the tax advantage

(20 - YOS) = the number of years until retirement eligibility.

Career military compensation under the blended retirement plan, for a servicemember at a certain YOS, is $PV_2(Y_{YOS=y})$:

$$PV_2(Y_{YOS=y}) = \left[\sum_{t=1}^{20-y} \frac{W_{(y+t)}}{(1+d)^t} \right] + \left[\frac{PV(A_2)}{(1+d)^{20-y}} \right] + [PV(FV(TSP))] + [PV(CB)] \quad (12)$$

This equation is the sum of annual wages, discounted by the PDR in each year, plus the discounted sum of the PV of the blended retirement pension, the PV of the FV of the TSP, and the PV of the continuation bonus.

For example, for an E7 at 16 YOS with 4 YOS left until retirement and a PDR of 12.7 percent, his or her current career military compensation is the sum of the discounted sum of career wages (\$245,555) and the discounted sum of the existing retirement pension's PV (\$125,510) [14]. Therefore, career military compensation equals \$371,065.

$$\begin{aligned} PV(Y_{YOS=16}) &= \left[\frac{\$81,420}{(1.127)^1} + \frac{\$81,420}{(1.127)^2} + \frac{\$82,828}{(1.127)^3} + \frac{\$82,828}{(1.127)^4} \right] + \left[\frac{\$202,476}{(1.127)^4} \right] \\ &= \$245,555 + \$125,510 = \$371,065 \end{aligned} \quad (13)$$

Following that, the percentage change in total career compensation after a reduction in the retirement benefit by some proportion α (in this case, 20 percent), an addition of the TSP, and an addition of the continuation bonus is δ :

$$\delta = \frac{\left[\frac{\alpha * PV(A_1)}{(1+d)^{20-YOS}} \right] + [PV(FV(TSP))] + [PV(CB)]}{\left[\sum_{t=1}^{20-YOS} \frac{W_{(YOS+t)}}{(1+d)^t} \right] + \left[\frac{PV(A_1)}{(1+d)^{20-YOS}} \right]}, \quad (14)$$

where:

α = change in the pension benefit; it is 20 percent in the commission's recommendation

δ = change in the PV of the total compensation brought about by the change in the retirement benefit.

Using our example, a 20-percent reduction in the retirement benefit and an addition of the TSP and continuation bonus causes a 5.2-percent reduction in total career compensation for an E7 at 16 YOS.³²

$$\delta = \frac{-\left[\frac{0.20 * \$202,476}{(1.127)^4}\right] + [\$5,779]}{\$371,065} = \frac{-\$19,323}{\$371,065} = -5.2\% \quad (15)$$

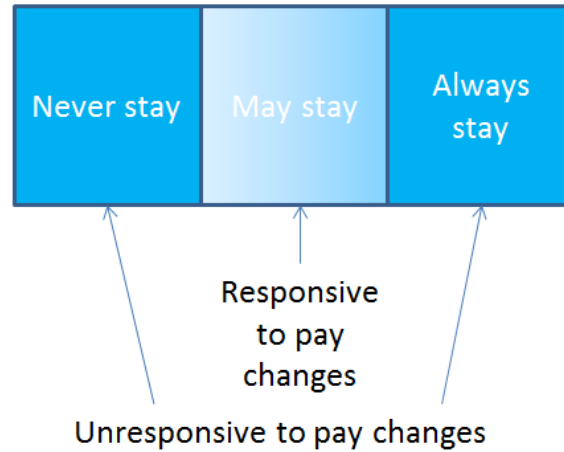
Change in retention

The second mechanism in the compensation and retention component is the effect of changes in career military compensation on retention rates. Career military compensation affects retention rates through the wage elasticity of retention. The wage elasticity of retention is the responsiveness of retention to compensation changes (see Figure 6).

Servicemembers can be sorted into three groups of pay responsiveness: those who will (1) never stay, (2) may stay, or (3) always stay, depending on how their compensation changes through retirement reform. Those who will never stay or will always stay—no matter how their pay changes—are unresponsive to pay changes. Their demand for additional military service is inelastic. Those who may stay—depending on pay changes—are responsive to them. They have elastic demand. The Marine Corps could raise pay enough to make all of them stay or could raise pay too little so that none of them stay. How elastic their retention is to compensation changes is called the wage elasticity of retention. A wage elasticity of retention of 2 means that a 1-percent change in career compensation causes a 2-percent increase in reenlistment rates.

³² A servicemember at YOS 16 has already received his or her continuation bonus at YOS 12, so the PV of the continuation bonus is zero in this equation.

Figure 6. Wage elasticity of retention: Responsiveness to changes in pay



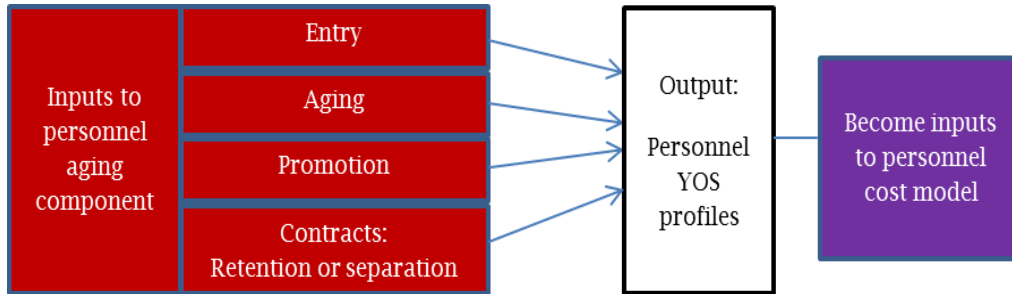
We will multiply δ by the wage elasticity of retention to estimate the effect of retirement reform on retention rates. Using our example, we multiply the change in total compensation brought about by the change in the pension benefit ($\delta = -6.8$ percent) by, for example, an elastic demand of 2 to obtain a -13.6-percent change in retention rates for a certain set of YOSs, or by, for example, a relatively inelastic demand of 0.8 to obtain a -5.4-percent change in retention rates for a certain set of YOSs.

We will enter these results into our model's personnel aging component to simulate short- and long-term changes in personnel YOS profiles.

Personnel aging component

The second component of CNA's simulation model is personnel aging. This component's objective is to identify how retirement reform affects personnel YOS profiles, as an output, and to use personnel YOS profiles as an input for the personnel cost model (the third component). We designed the personnel aging model to simulate the entry, aging, promotion, contracts, retention, or separation of servicemembers (see Figure 7).

Figure 7. Inputs and outputs of personnel aging model



We will use historical Marine Corps personnel inventory data in the personnel aging model, including average retention rates and attrition rates, by zone. Personnel enter the personnel aging component at YOS 0, gain 1 YOS each year while remaining in the service, reach the ends of contracts (and either continue or separate), and promote. Baseline retention, end-of-contract, and separation rates in the model will be based on average historical rates from the data.

After we estimate the effects on retention rates (the first component), we enter the new retention rates into the personnel aging model (the second component) and run the results for a number of simulated years—long enough to reach a new steady state.

These results then become inputs for the cost component.

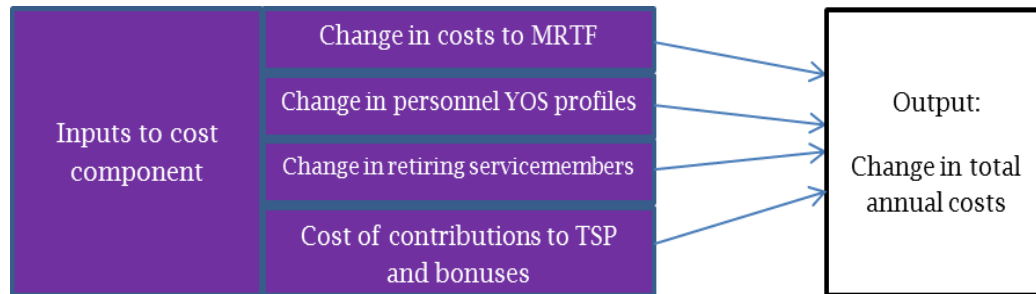
Personnel cost component

The third component of CNA's simulation model is a cost component. In this component, there are four mechanisms through which retirement reform affects personnel costs:

1. The retirement benefit directly affects personnel costs via the services' annual accruals to the MRTF and through contributions to the servicemembers' TSP accounts.
2. Personnel YOS profiles affect personnel costs.
3. Changes to the number of retiring servicemembers affect personnel costs.
4. The use of continuation bonuses—to minimize the effect on personnel YOS profiles—affects personnel costs (see Figure 8).

We describe each, in turn.

Figure 8. Inputs and outputs of cost model



First, the change to the retirement benefit affects personnel costs directly. By reducing the retirement benefit's value at YOS 20, the Marine Corps can make smaller MRTF contributions as a percentage of basic pay. This is straightforward. The current retirement system requires the Marine Corps to contribute 33 percent of total basic pay each year. If the reform reduces the retirement pension by a factor, α , the annual normal cost amount for active servicemembers is reduced to:

$$(1 - \alpha) * 0.33 * \text{base pay}$$

In our cost model, we would calculate the long-run accrual rate from a 20-percent cut in the retirement pension (i.e., $\alpha = 0.2$) as:

$$0.8 * 0.33 * \text{base pay} = 0.264 * \text{base pay}$$

This is the expected long-term result once all servicemembers are on the blended retirement system, assuming no change in the number or YOS profiles of servicemembers who retire.³³

Second, personnel YOS profiles affect personnel costs. To the extent that retirement reform changes the YOS profile of the force, the Marine Corps' total base pay bill will change. Senior personnel earn more than junior personnel so, if, for example,

³³ During the period between the start of the blended plan and the time when all servicemembers must enroll in it, the estimated normal cost rate will fall below 33 percent because some servicemembers will opt-in to the new blended plan and all new servicemembers will automatically fall under it. The DOD's Office of the Actuary will phase in the short-run changes in the normal cost rate in accordance with its enrollment expectations. We will request information from the DOD Office of the Actuary about its plans to phase in short-run changes in the Marine Corps' normal cost rate.

retirement reform creates a more junior force, the Marine Corps' base pay bill would decrease. Of course, if mid-level and senior personnel were to separate at higher rates as a result of retirement reform, the Marine Corps would need to recruit more to maintain endstrength, and recruiting costs might rise. At the same time, with fewer mid-level and senior personnel, the costs of continuation bonuses could change. The total change in wage costs would be the difference between the change in the costs of base pay and recruitment and retention bonuses. In our cost model, after simulating the personnel effect from retirement reform, we calculate the new wage bill using the new personnel YOS profiles.

Third, a change in the number of retiring servicemembers affects personnel costs. This follows from the first two factors. A change in the number of senior personnel implies that the number of servicemembers who will ultimately reach retirement eligibility will change. Because the annual MRTF accruals are a function of the expected value of the pension and the expected number of retirees, the accrual amount also will change. A 20-percent cut in the retirement annuity will change the number of retirees (in the long run). This will change annual accruals in addition to the 20-percent reduction due to the benefit cut.

Fourth, the use of continuation bonuses—to minimize the effect on personnel YOS profiles—affects personnel costs. Here, the Marine Corps would replace the value of the lost pension benefit with continuation bonuses or some other type of current pay. In the commission's proposal, continuation pay would be paid at 12 YOS for all servicemembers. In the DOD proposal, the Marine Corps would have the flexibility to determine the YOS (between 8 and 16) at which continuation pay would be paid, among other features (eligible skills, the multiplier, the payout construct, and the service obligation). Replacing the lost pension's value will reduce potential savings for the Corps; however, because personnel tend to discount deferred pay more than the Marine Corps does, the Marine Corps need not replace the entire value of the lost benefit to maintain retention. To some extent, the Marine Corps can save personnel costs by reducing the retirement benefit and replacing the lost value with continuation bonuses. It can do this because PDRs are estimated to be greater than the Marine Corps' interest rate of 2.75 percent [9-12].

Data

We will use Marine Corps personnel data in our simulation models to estimate the range of possible effects of retirement reform on personnel YOS profiles and costs. We have 30 years of Marine Corps personnel data for the AC and 14 years for the RC. To calculate AC enlisted and officer personnel profiles and retention rates, we will need accession and loss data. Accession data come from the Automated Recruit Management System (ARMS) for 1979-2001 accession cohorts and the Marine Corps Recruiting Information Support System (MCRISS) for 2002-2015 accession cohorts.

Loss data (and other data) come from Total Force Data Warehouse (TFDW) for 1985 to the present.

To calculate RC enlisted and officer personnel profiles and retention rates, we will use individual RC servicemember records from the Marine Corps Total Force System (MCTFS) for 2001-2015 accession cohorts and the Defense Manpower Data Center's Reserve Components Common Personnel Data System data for September 1999-2015 accession cohorts.

As described above, the simulation model will use Marine Corps personnel data to estimate personnel inventories and retention rates by paygrade and YOS. This will allow us to estimate the short- and long-term effects of reform on personnel YOS profiles and compensation costs.

Assumptions to be tested

Our simulation model requires that we make assumptions about the possible ranges of PDRs and wage elasticities. We also make assumptions about other model aspects, including servicemember TSP contributions, the market return rate, continuation pay, and grandfathering rates.

Discount rates

As previously described, a PDR characterizes the degree to which a person prefers current over deferred pay. We have described the potential range of PDRs that are based on characteristics of both the servicemembers whose PDRs we are estimating and the components of pay that we are changing.

The commission assumes a PDR of 6.4 percent for officers and 12.7 percent for enlisted servicemembers. We will use both the commission's assumed rates and the range of PDRs from the literature and subject these assumptions to sensitivity analysis. The PDR matters in the calculation of the PV of wages and the retirement benefit; it also matters in the assumptions about the percentages of those who will choose lump-sum payout options over monthly annuities (i.e., implied PDRs). This matters to the Marine Corps because what PDRs actually are—and how different they are from the commission's assumptions—will affect Marine Corps personnel YOS profiles and costs.

Wage elasticities of retention

As described above, whether wage elasticities are high (i.e., greater than 1) or low (i.e., less than 1) determine whether a cut in the retirement benefit will result in a

large or small reduction in reenlistments, respectively. Wage elasticities vary across individuals—due to differences in age, education, family status, and occupation—and over time as personnel YOS profiles change.

The authors of a 2012 study estimated average wage elasticities for military physicians of 1.87 at the first retention reenlistment point and a range of elasticities from 0.9 to 0.2 at subsequent reenlistment points [15]. The authors of a 1999 study found wage elasticities to be statistically no different from zero across services and for enlisted and officers, except for zone B Navy enlisted personnel (with a wage elasticity of 1.5) and zone C Air Force officers (with a wage elasticity of 0.8) [16]. Four retention studies show wage elasticity estimates that range from 0.56 to 2.25, depending on service, occupation, and YOS, with a median elasticity of roughly 1.5 [17-20].

We will use both the commission's assumed rates and the range of wage elasticities from the literature and subject these assumptions to sensitivity analysis. We will assume a set of baseline and high wage elasticities separately for enlisted personnel and officers that, in keeping with the literature, decline with YOS and have a "seniority effect" that is stronger for officers than enlisted. We will multiply these elasticities by the change in career compensation to estimate the expected retention change.

Other assumptions

We make assumptions about other model aspects, including servicemember TSP contributions, grandfathering rates, the market return rate, and continuation pay.

The default servicemember TSP contribution is 3 percent of base pay. The commission assumes that, on average, servicemembers will contribute 3 percent of base pay to the TSP. We will vary the distribution of servicemember TSP contributions on entry based on a literature review of take-rates in default settings.

Although automatic grandfathering in the current retirement system is an element of the commission's plan, the commission assumes that roughly 80 percent of servicemembers with less than 12 YOS will choose to transition to the blended retirement system (almost 95 percent of those at YOS 1 and over 50 percent of those at YOS 11). After YOS 12, the commission assumes that no servicemembers will choose the blended retirement plan because they would receive the negative aspects (a 20-percent reduction in their retirement benefit) with none of the positive benefits (no continuation pay after YOS 12).

We will subject servicemember TSP contributions, grandfathering rates, an assumed market return rate of 5 percent (as this affects the value of the retirement benefit),

and continuation pay in DOD's proposal (which allows up to 11 and 22 months of base pay for RC and AC servicemembers between 8 and 16 YOS) to sensitivity tests.

In the next section, we further discuss continuation pay and grandfathering rates because they are both model elements.

Scenarios

In this section, we discuss the scenarios' objective and approach, as well as the range of possible scenarios that we expect to model in our follow-on analysis.

Objective

The objective of simulating a range of possible scenarios is to understand the expected range of costs and benefits of retirement reform, for both the Marine Corps and the individual Marine. Previously, we hypothesized the *direction* of the commission's plan's effects on FMOs. In the follow-on analysis, we will estimate the *magnitude* of these effects using the CNA simulation model.

Approach

For each retirement plan scenario, we will simulate the effects by component and service type: AC enlisted, AC officer, RC enlisted, RC officer, combined AC/RC time (enlisted and officer), and by occupational area (selectively). We will model the effect of retirement reform on personnel YOS profiles and costs through the initial implementation years (showing the transition) into full implementation (steady state).

First set of scenarios

The first set of scenarios that we will empirically model are the existing retirement plan, the commission's blended retirement plan, and DOD's retirement proposal. There is the potential that other hybrid retirement proposals will arise, such as NDAA congressional adjustments to the commission's plan, and we will factor that into our analysis. In the first set of scenarios, we will use the commission's PDR, wage elasticity, servicemember TSP contribution, and grandfathering assumptions. In the second set of scenarios, we will test these assumptions.

Commission's assumptions

As we discussed, the commission assumes an average discount rate of 12.7 for enlisted personnel and 6.4 for officers, an average servicemember TSP contribution of 3 percent of base pay, and, for grandfathering, a blended retirement plan take-rate of about 80 percent that is decreasing in YOS and zero after YOS 12.

Modeling the existing retirement plan

We will model two main components of the existing plan:

- A defined benefit (DB) with a retirement annuity calculated as $0.025 * \text{High-3 base pay} * \text{YOS}$
- Cliff-vesting at 20 YOS

This is the baseline model that we will use. Here, we build the DB and cliff-vesting into the compensation and retention component. We only run the personnel aging model and cost model once a change in the existing retirement plan extracts a change in retention rates from the compensation and retention model. The next two subsections describe the model's flow when we change the existing retirement plan.

Modeling the commission's retirement plan

We will model four main components of the commission's plan:

- A DC component (the TSP) in which a service contribution of 1 percent of basic pay starts at entry, is vested after YOS 2, and is eligible for up to a 5-percent match of servicemember contributions after YOS 2
- Continuation pay that is receivable at YOS 12 for servicemembers who incur an additional 4-year obligation (2.5 times monthly base pay)
- A DB with a 20-percent reduction in the retirement annuity, calculated as $0.02 * \text{base pay} * \text{YOS}$, where YOS is computed by dividing reserve points by 360 for RC servicemembers:
 - Payout options at retirement for AC servicemembers include (1) monthly retirement payments, (2) a lump-sum amount with reduced monthly retirement payments until full social security eligibility, or (3) a larger lump-sum payment with no monthly retirement payments until reaching full social security eligibility
 - RC servicemembers can choose from (2) or (3) above, with lump sums paid on RC retirement, which will usually be before the retirement annuity begins at age 60

- Automatic grandfathering in the current retirement system with a choice to transition to the new blended retirement plan

Here, we discuss the model's flow using the four main components of the commission's plan. In the compensation and retention component of the simulation model, we will calculate the following: (1) the PV of the retirement annuity using a multiplier of 0.025, with the three payout options, (2) the TSP with a 1-percent service contribution at entry, vesting, and up to a 5-percent matching contribution after YOS 2, and (3) continuation pay at 12 YOS. Component 4, grandfathering, takes place once the model has been fully simulated.

We will run the compensation and retention component with the above changes (the commission's plan), using the commission's assumptions, and obtain retention rates, by zone. We will input retention rates, by zone, into the personnel aging component to obtain personnel YOS profiles. We will input personnel YOS profiles into the personnel cost component to obtain the total cost change as a result of the commission's retirement reform plan.

Once we have fully simulated the model, we will isolate the effects on personnel YOS profiles, costs, and FMOs of automatically grandfathering 100 percent of current servicemembers into the current system, and the more likely scenario that roughly 80 percent of servicemembers with less than 12 YOS will choose the new blended retirement plan (decreasing in YOS from YOS 1 through YOS 12), and no servicemembers with over 12 YOS will choose the blended retirement plan.

Modeling DOD's retirement proposal

Next, we will model three DOD-recommended changes to the commission's plan:

- Service matching contributions are delayed until completion of 4 YOS rather than 2 YOS
- Service flexibility/control of continuation pay:
 - Paid between 8 and 16 YOS
 - Service selects eligible skills
 - Multiplier would be up to 22 times monthly base pay for AC and up to 11 times monthly base pay for RC
 - Service determines payout construct
 - Service determines service obligation (DOD minimum of 1 YOS)
- No lump-sum payout options at retirement

We will calculate DOD's retirement proposal using the same methodology as above:

1. Modify the compensation and retention component inputs of CNA's simulation model from the commission's plan to include vesting at 4 YOS rather than 2 YOS, flexibility in continuation pay, and only a monthly annuity (no lump sum) payout, and obtain retention rates, by zone, as outputs.
2. Input retention rates, by zone, into the personnel aging model, and obtain personnel profiles as outputs.
3. Input personnel profiles into the cost model and obtain the total cost change as a result of the DOD retirement proposal as an output.

Second set of scenarios

In the second set of scenarios, we will use the empirical models describing the existing plan, commission's plan, and DOD's proposal, but subject their assumptions to sensitivity analysis. Specifically, we will test for sensitivity to changes in PDRs, wage elasticities, servicemember TSP contributions, grandfathering rates, market interest rates, and continuation pay. We will calculate the effects on personnel YOS profiles, costs, and related FMOs when the assumptions are higher or lower than the commission and DOD assumed.

Effect on individual Marines

Each scenario primarily looks at the expected costs and benefits of retirement reform for the Marine Corps. Yet each scenario also will have an effect on the individual Marine. Previously, we discussed the effect of retirement reform on the quality of life of the individual Marine as an FMO. For example, servicemembers may end up taking loans from their TSP, in which case their entire (untouched) TSP will not be available when they separate. In our analysis, we will consider the extent to which future income gets converted into current consumption.

In addition, an output of the follow-on analysis will be a calculator that helps Marines to evaluate their retirement choices.

Internal adjustments to mitigate negative effects

Based on our analysis of the commission's plan and DOD's proposal in the follow-on study, we may find that the Marine Corps will have a more junior or senior force, or a

more costly force, unless it takes force management actions to mitigate those changes. Once the follow-on analysis is complete, we will recommend adjustments to internal force management plans and policies that the Marine Corps can use (e.g., the additional continuation pay that would be needed) to mitigate any negative effects and maintain its FMOs—be it to maintain personnel YOS profiles or maintain a dependable accession pipeline.

Conclusion

The MCRMC's proposed blended retirement plan appears to be rapidly working its way through the legislative process with what appear to only be minor modifications. Despite the significant amount of analysis that the MCRMC did to develop the proposed plan, the services will have to conduct additional analysis to facilitate plan implementation. This report begins that analytic process for the Marine Corps. As a primer for our larger follow-on study, this report (1) recaps the basics features of the proposed plan, (2) reviews compensation basics, (3) identifies key FMOs that could be affected by compensation changes, (4) provides preliminary analysis for how these FMOs could be affected by the proposed plan, and (5) provides a framework for our follow-on analysis.

Our preliminary analysis is not a sufficient basis on which senior Marine Corps leaders should make key decisions about the proposed plan's implementation. It is intended to help explore how the proposed plan could affect the Marine Corps and to help uncover the questions and issues that follow-on analysis can address. Although the analytic methods to model how a retirement plan change affects organizations and their employees are fairly well established, these methods require important assumptions about how employees will respond to the changes. Although the MCRMC assumptions may be reasonable, they may not be correct. A major focus of our follow-on analysis will be to test how key outcomes of the proposed plan vary when we vary assumptions about PDRs and wage elasticities of retention. By estimating proposed plan outcomes with a range of plausible assumptions, we will be able to help policy-makers better understand the range of plausible outcomes and to help manpower planners and budgeters plan for these outcomes.

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